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Chemical Industries

The Chemical Business Magazine

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Chemical Industries

THE BUSINESS MAGAZINE for MAKERS and USERS of CHEMICALS
Management • Research • Production • Marketing

VOL. 54—NO. 1

January, 1944

Contents

Published monthly, except twice in October, and entered as 2nd class matter Dec. 22, 1934, at the Post Office at New Haven, Conn., under the Act of March 3, 1879. Subscription, Domestic, Canadian and Latin American, $4 a year; Foreign $5. Single copies, 50 cents; November issue, 75 cents. Canadian subscriptions and remittances may be sent in Canadian funds to Chemical Industries, P. O. Box 100, Terminal A, Toronto, Canada. Copyrighted, 1943, by Tradepress Publishing Corp., 522 Fifth Avenue, New York 18, N. Y., Murray Hill 2-7888; Horace T. Hunter, President; John R. Thompson, Vice-President and Treasurer; J. L. Frazier, Secretary.

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THE READER WRITES

So You Want to Be a Chemist?

This month we devote the lead position on this page to one of our readers who recently became a writer—at least long enough to turn out a very delightful little book. Dr. Herbert Coith, manager of the product service department of Procter & Gamble, is the author of that sparkling—and very practical—little volume "So You Want to Be a Chemist?" just published by the McGraw-Hill Book Co.

Apparently a bit self conscious about starting each chapter on so sober a subject with a verse from a rollicking piece of home-made balladry, Dr. Coith included the following in his preface:

"Laymen are apt to regard us as an uncompromisingly serious-minded lot and unfortunately when they have decided that about us, it is sometimes hard to get them to accept us as members-in-good-standing of a business organization. There seemed to be some point in reminding ourselves, and perhaps others as well, that after all, chemists are people too."

So just to prove that even editors, too, are people, we reproduce here for other people some of the verses of Dr. Coith's "ballad," each of which introduces a chapter in the book. Supply your own tune.

—EDITOR.

What Is a Chemist?

We're a wondrous big division of a prosperous company.
We're the chemists.
Bum! Bum!*
We consist of a director and a young washboy and me
And other chemists.
Bum! Bum!
And other chemists.
Some cynical folks around the place just wonder what we do,
And frankly, there are days, b'gosh, when some of us wonder, too.
But we'll show the dirty doubters something new before we're through.
We're the chemists.
Bum! Bum!
We're the chemists.

Standards

Some analyze the samples that are brought in by the bunch.
Weary chemists.
Bum! Bum!
Weary chemists.
And others grade the garbage grease, then sit near us at lunch.
Smeary chemists.
Bum! Bum!
Smeary chemists.
And some set specifications telling our buyers what to buy,
While others write "Factory Standards" telling what to do and why.
They help the superintendents out, or anyhow they try.
We're the chemists.
Bum! Bum!
We're the chemists.

Research and Plant Development

There are some who do research* work; into the deep, deep stuff they grope.
Learned chemists.
Bum! Bum!
High-brow chemists.
And others may nurse a process which some day will work, they hope.
Earnest chemists.
Bum! Bum!
Patient chemists.
Some work with hydrogenation machines, learning all their wondrous ways,
And soon they'll give us castor oil we'll think is mayonnaise,
Then we won't be quite ourselves again for days 'n' days 'n' days.
That's not just chemistry! Bum!
That's also physics!

Products Service

Now some of us call on the customer to find out what he wants.
Traveling chemists.
Bum! Bum!
Inquiring chemists.
And some of us run complaints down, bearding kickers in their haunts.
Unraveling chemists.
Bum! Bum!
Perspiring chemists.
Some explain our wares in our salesmen's schools so those boys will be wise,
And some of us try to work out new ideas to advertise
So folks will buy from us instead of from the other guys.
But we're chemists.
Bum! Bum!
We're the chemists.

The Kind of Chemists Industry Wants

We're a hopeful group of students setting out to find some jobs.
We want to be chemists.
Bum! Bum!
We want to be chemists.
We would like to have our money come in gobs 'n' gobs 'n' gobs—
If that happens to chemists.
Bum! Bum!
If that happens to chemists.
There are some of us who made the highest grades in all the class,
And some of us were happy if we managed just to pass,
But bright or dumb, commercially we're all as green as grass,
But we want to be chemists.
Bum! Bum!
We want to be chemists.

The Kind of Industries Chemists Want

We're an assorted bunch of industries that make this country's wealth.
We hire chemists.
Bum! Bum!
We hire chemists.
And sometimes, when they fail to help our economic health,
We fire chemists.
Bum! Bum!
We fire chemists.
Now some of us need the chemists' aid in a serious, vital way,
Others might do without them, but we're pretty sure they pay,
While some of us simply keep them, but just why we couldn't say.
But we have chemists.
Bum! Bum!
We hire chemists.

* Words inserted to round out the rhythm, not adjectives referring to chemists.

* You will not get the beautiful musical flow of the words in this passage if you mispronounce "research." The accent should be on the second syllable, thus, "There are some who do re*search* work."

Gum Arabic Preservatives

To the Editor of Chemical Industries:

We have read Dr. Mason's article on Gum Arabic in the November issue of CHEMICAL INDUSTRIES and note that he recommends sodium pyrophosphate, sodium benzoate and formaldehyde as preservatives for this gum.

To the best of our knowledge, sodium pyrophosphate has absolutely no preserving action, and although sodium benzoate and formaldehyde in fairly high percentages may sometimes work, we beg to draw your attention to a preservative which we offer under the name of "Chemosol" and which has been found to have a superior preserving action, particularly on aqueous solutions of gums as well as their emulsions in oil or water. Only 0.15-0.2 per cent are required for complete preservation which is effective not only in acid media but to a certain extent also at pH's higher than 7.

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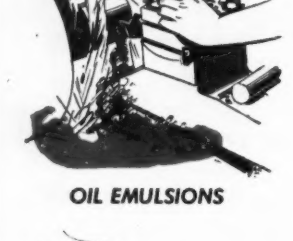

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WASHINGTON

T. N. SANDIFER *reporting*

Revised Patent Bill . AMGOT Policy . Civilian Requirements Disposal of Surpluses . Experimental Plants

Patents Again Attacked in Revised H. R. 1371

IN THE LATEST MOVE of the so-called "anti-monopoly bloc" in Congress, which has taken for its particular pigeon the alleged cartels and other patent agreements of large American interests, Representative Voorhis, of California, has introduced a drastically revised version of his H.R. 1371.

The announced purpose is to "curb some of the worst abuses in connection with patents." The revised bill comprises five sections amending the Clayton Antitrust Act, and if passed, would become Sec. 27-31 inclusive, of that Act.

The heart of the bill, Section 29, would make illegal, under prescribed circumstances, both the use of some patents and the non-use of others, and provides for voidance of the patents in event of violation of this provision.

The bill specifically forbids, first, use of patents "as a means of restricting unreasonably the production of important needed commodities," and second, use of patent agreements, assignments or leases as a means of controlling prices. Another section, 27, greatly broadens the grounds on which the Government would be required to intervene in patent litigation—in effect would give the Government close supervisory powers over patent operations.

Referring to Section 29, regarding use and non-use of patents, Mr. Voorhis remarked: "It is hardly necessary to emphasize the fact that refusal to permit use of a patented process by a corporation owning right to it may be a restraint of production and commerce of the most far-reaching consequence . . . Section 29 makes illegal any use or non-use of a patent which has the effect of unreasonably limiting the supply of any article of commerce. . . . We need only remember what has happened in connection with synthetic rubber in the United States within the past very few years to see the importance of this point."

MR. VOORHIS' REFERENCE serves to bring up a point not usually made by his group, as to what actually did happen. The point is that what happened before Pearl Harbor falls legitimately into the field of private enterprise and its peace-time prerogatives, and what happened afterward is a much different story.

On the latter phase of the matter, Rubber Director Bradley Dewey has given members of Congress a brief history that doubtless will be made public at some near future date. Meanwhile, it can be summarized as follows:

Shortly after Pearl Harbor the Rubber Reserve Company entered into agreements with a number of private companies covering exchange of patent rights and technical information in production of buna rubber, butadiene, and styrene, and in addition made arrangements with Standard Oil Development Company and E. I. du Pont de Nemours & Company respecting manufacture of butyl rubber and neoprene, respectively. The agreements have served as a basis for pooling and exchange of technical information in the program of synthetic rubber manufacture for the war, and as a basis for cooperation by various private companies in improvement of processes and products in this field.

Space does not permit covering the details of the various agreements. It may be noted, however, that the Rubber Reserve Company is preparing a digest of its patent agreements and expects to have printed copies available shortly upon request.

Most of these patent agreements provide for licensing of companies purchasing or leasing Government-built plants after the war. Rubber Reserve Company also plans to arrange for transfer of royalty-free rights in the synthetic rubber field under patents on inventions made in the course of Government-financed research. (This broad idea is likewise covered by various pending bills.)

AS TO SPECIFIC PATENTS, because of possible interest of the Alien Property Custodian in certain Standard-owned patents, Rubber Reserve has an arrangement with the APC by which the latter has made available to Rubber Reserve, licenses and licensing rights covering a number of products including general-purpose buna rubbers.

Companies executing a standard cross-license agreement with Rubber Reserve, therefore, receive licenses in the field of general-purpose buna rubbers under patents affected by vesting orders of APC, under patents growing out of government-financed research, and under patents of all other companies executing similar cross-licensing agreements, including the Standard Oil Company. (*Continued on next page.*)

"As of today, therefore," Mr. Dewey has reported, "as the result of arrangements made pursuant to Standard's offer (of patents), the Rubber Director is in a position to say to any company willing to assist in the development of general-purpose rubbers of the buna type, that in return for contribution of its 'know-how' and patent developments it can enjoy free rights under the patents of Standard and most of the other companies who have been and will be, working in this field."

AMGOT Question of Policy

RECALLING A REFERENCE on this page in November to the absence of chemical representatives in the AMGOT organization, the beginnings of a policy on filling general requirements in foreign rehabilitated areas are becoming apparent. The present arrangement is that such requirements will be referred to the Combined Production and Resources Board of WPB, and CPRB will then recommend the extent to which these requirements will be met, and from what source. An interesting question seems to be still under debate —should the industries of the countries involved be restored sufficiently to permit them to meet particular needs, or should these material needs be supplied by going industry on this side?

Break for Civilian Requirements

THE FIRST BREAK in what has been a solid war production front, in favor of civilian requirements, has come rather sooner than most observers looked for it. This refers to permission to certain industries to begin production of such civilian needs as electric irons and other work-a-day articles on a large scale. How soon this trend will reach the chemical field depends obviously on war developments.

One of the first steps in this direction has been WPB action lifting restrictions on cobalt, tungsten, vanadium, and molybdenum. Recently there have been indications that Army Air Force steel drum requirements might be currently at satisfactory levels. Allocations for the first quarter steel drum production have been made, but what disposition may be made of any surplus of either material or drums has not been announced.

Disposal of Surpluses

THE WHOLE QUESTION of disposal of surplus war materials is being agitated here. With approximately a dozen governmental groups busying themselves with possible programs, and such figures as Director Byrnes of the Office of War Mobilization, Bernard Baruch, and others, besides the Treasury Procurement, Army, Navy, OPA, etc., interested, Congress has now stepped in.

A pending bill, which has considerable steam behind it, proposes a central committee, composed of interested agency representatives, operating with the aid of advisory committees from the business and trade fields concerned with the goods involved.

Status of Government Experimental Plants

RECALLING A BRIEF SUMMARY in Chemical Industries in November on proposed experimental plants for extraction of alumina and other chemicals from domestic clays; hydrogenation of coal; and various other experimental processes, it now appears that these projects may be pushed after all.

One reason for the change in direction, so far as alumina is involved, is said to be the progress of certain experiments which has been faster than anticipated.

Laboratory work has reached a stage where it is now necessary to undertake full-scale pilot plant operations, in cooperation with certain chemical companies, for production of iron-free aluminum sulfate or alum, which is used in preparation of catalysts for high-octane gasoline. This work is said to be necessary to make the process available to industry for production of this material.

Now being made by another method, using alumina of the highest grade, the advantage claimed for the experimental process is that it will obviate use and diversion of this high-grade material needed for manufacture of metallic aluminum.

An engineer of the Interior Department, P. S. Roller, is credited with the discovery that a highly pure aluminum sulfate can be produced by addition of alcohol to the impure alum solution obtained from clay. A pilot plant has been in operation at Tuscaloosa, Ala., and certain private chemical interests have been closely in touch with the progress being made.

On the basis of what was known, and the possibilities thus disclosed, D. P. Morgan, director of WPB's Chemical Division, in a letter to R. S. Dean of the Bureau of Mines, urged commercial production "with all possible haste."

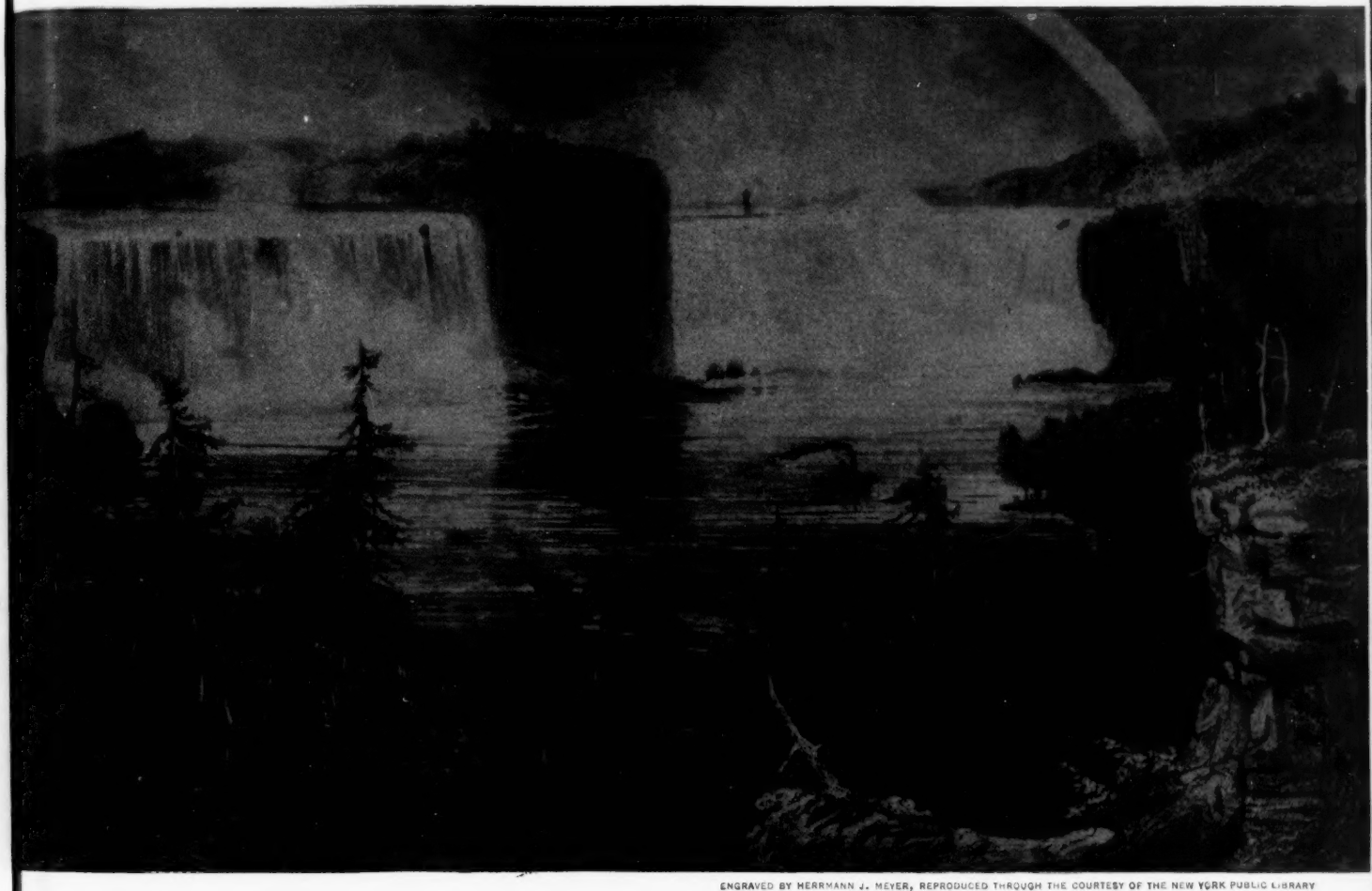
Thus the First Supplemental National Defense Appropriation Bill carried appropriations to cover pilot plant work for production of alumina from low-grade bauxite, aluminum clays, and alunite, for the fiscal 1944 year; for two processes in producing magnesium—carbothermic reduction of magnesia, and extraction of pure magnesia from olivine; and an item for development of recovery processes on waste metals, such as recovery of aluminum, alumina, and aluminum salts from aluminum-bearing dross obtained from smelting operations.

The O'Mahoney bill, for developing fuels by hydrogenation of coals, is in the House at this writing, but plans are ready for exploitation of the program.

It is perhaps not fair to speculate what will happen to these projects if the war's end in 1944 should leave industry with huge surpluses in all these fields resulting from present facilities. As has been noted earlier, there is considerable political pressure from sectional interests behind all these proposals, all a part of a very broad pattern.

Traditions of Niagara

"THE THUNDER OF WATERS"



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An Essential Part Of America's Great Chemical Enterprise

From the Indians the early explorers in the Niagara region first learned of the Great Cataract in the wilderness whose roar could be heard for many miles. According to Indian folklore it was a symbol of the earth's power . . . the voice of Nature herself speaking in the "Thunder of Waters."

How accurate this primitive interpretation was may be seen today in modern Niagara—source of the vast hydro-electric power upon which a great network of industries depends. As a pioneer company in this area from which America derives much of its great industrial vitality, Niagara Alkali Company is working day and night to carry on its progressive traditions . . . and to augment, by research and improved manufacturing methods, the flow of chemicals essential to the war effort. By such activities and by close cooperation with chemical-using industries, is Niagara helping to fulfill the ancient promise of the "Thunder of Waters."

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ARMY NAVY

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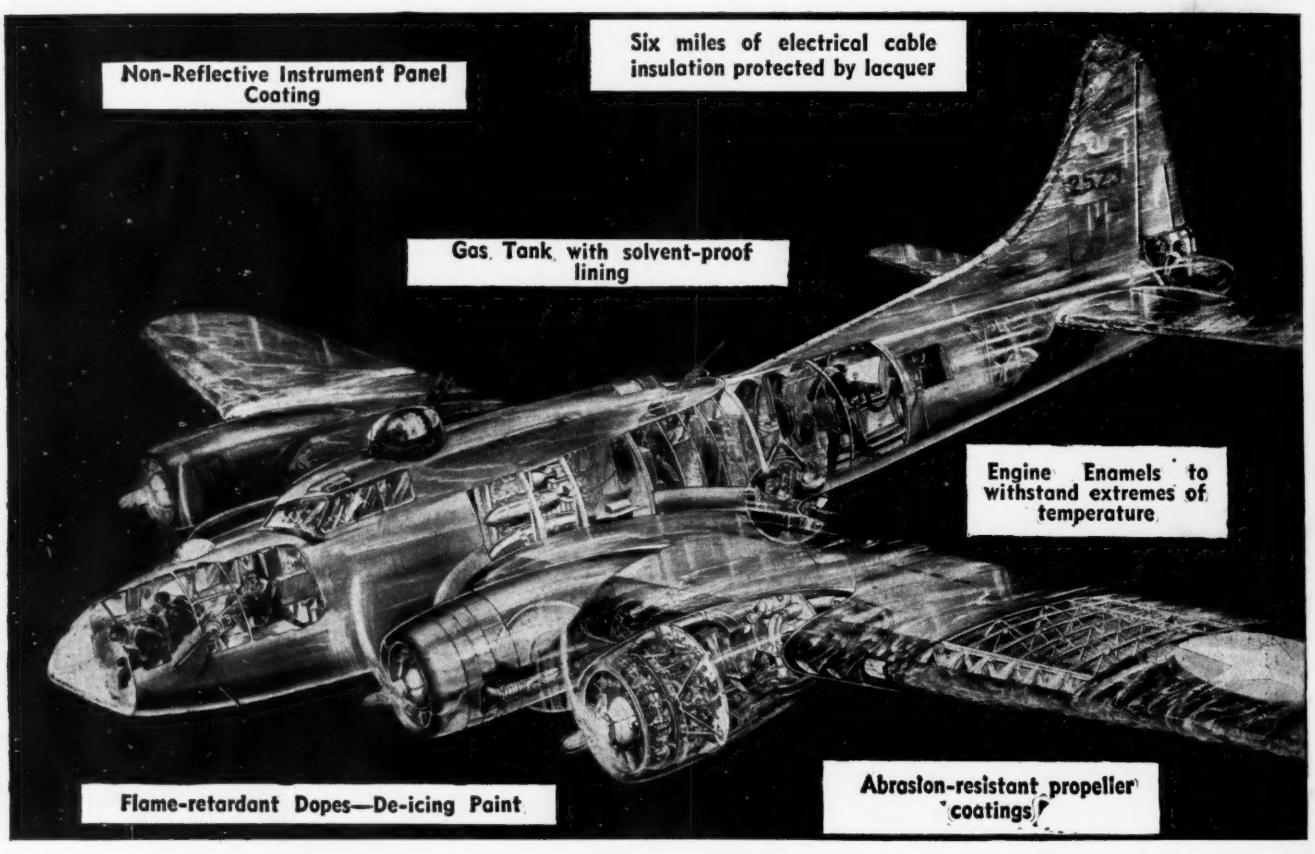
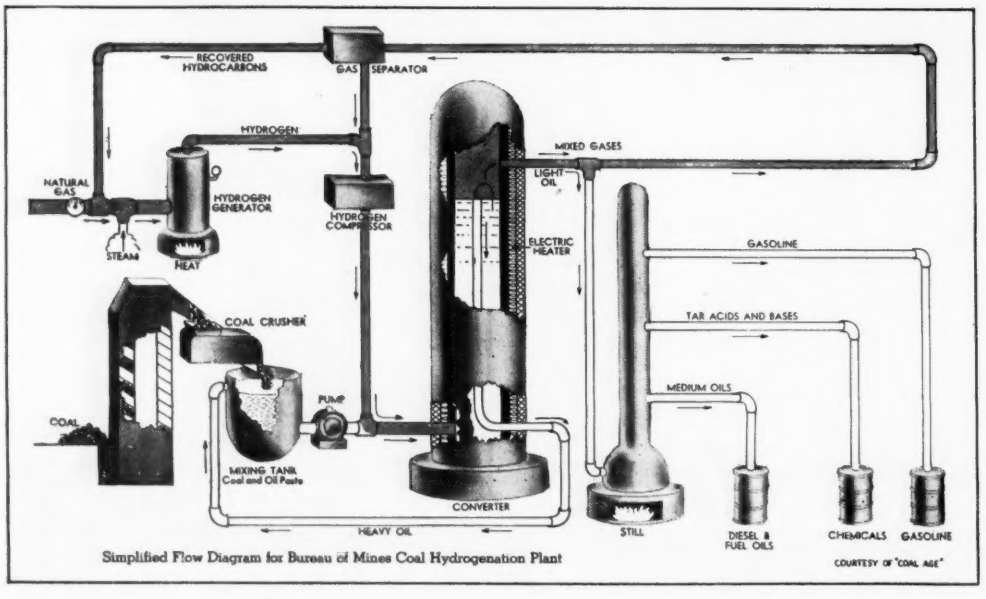
Life On The





Simplified Flow Diagram for Bureau of Mines Coal Hydrogenation Plant

(*Above*) **WAR PAINT ON AIRCRAFT** must be made to stand up under abrupt atmospheric changes from the often blistering heat of landing fields to the sub-zero temperatures of the stratosphere and it must take the pounding of sleet, sand storm and gale. Quality paint vehicles, made with Cyanamid's REZYL* and PHENAC** Resins, produce tough, superior, anti-corrosive paints to meet rigid Army and Navy aircraft requirements.

(*Left*) **GASOLINE FROM COAL** promises to take the place of our rapidly dwindling petroleum gasoline resources. Developed thirty years ago coal-into-gasoline processes are just now coming of age. It's about time, too, for our proved petroleum reserves are limited. Whereas we have 670 times as much coal in the ground as we have oil.

Chemical Newsfront

(*Below*) **TAKING THE SALT OUT OF SEA WATER** is the near miracle which has been accomplished by the U. S. Naval Medical Research laboratories at Bethesda, Maryland. Under the stress of all-out air and sea warfare, the vital need for improvements in life-saving techniques has resulted in the development of a new and simplified method of desalinating sea water to make it fit to drink. The process consists of dropping a briquet of the desalinating compound about the size of a bar of soap into a plastic bag containing sea water. The bag is kneaded for a few minutes, and then in about twenty minutes the chemicals have done their work and the water, although of an odd but palatable taste, is quite safe to drink. No longer will shipwreck hold the terrors of centuries past.

(*Above*) **PAPER DELIVERS THE GOODS** through rain or shine when it is bonded with Cyanamid "Wet-Strength" Resin. Bonding fibers together so that they remain highly resistant to separation when exposed to moisture, this new resin finds timely uses in papers to package articles which must be transported in inclement weather...not only for shopping bags on the home front, but especially for packages of military supplies, and for maps, charts and blueprints. *Reg. U. S. Pat. Off.

This "SMEAR CAMPAIGN" Saves Soldiers' Lives!

In the treatment of malaria, as in pneumonia, positive identification of the presence and the particular type of parasite is the most helpful first step to the cure. Only positive diagnosis of BOTH the presence and type of malaria is by blood test using the thick-drop technique . . . thick smears stained to reveal the particular parasite by its shape, size and pigmentation.

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So again, National, as an important producer of anti-malarial QUINACRINE and malaria diagnosing GIEMSA'S STAIN, is performing a noteworthy service in helping to reduce the human cost of reconquering the tropics.

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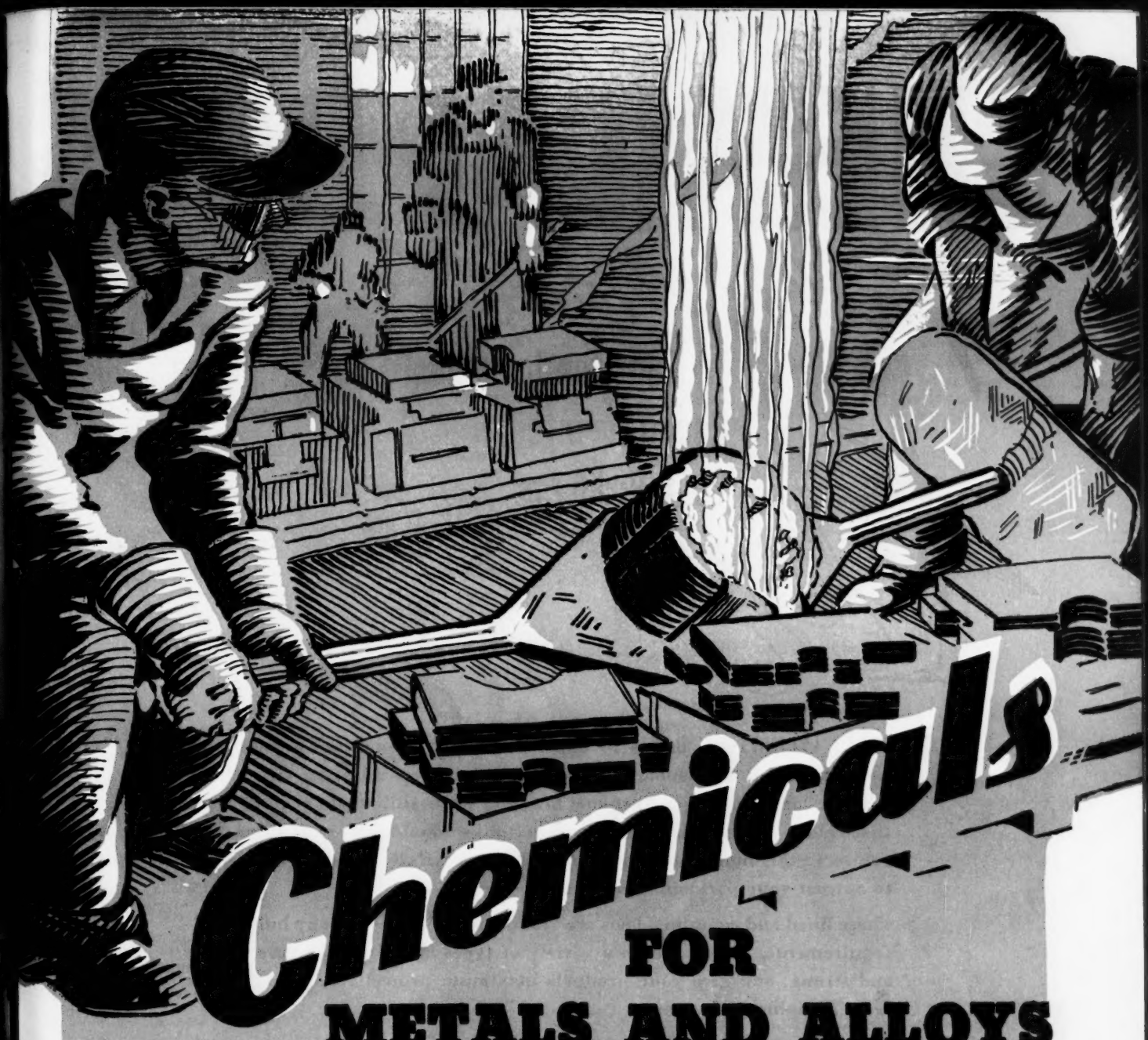

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Stauffer supplies large quantities of industrial chemicals to the metals and alloys industries. Like many other large chemical consumers the metals industry looks to Stauffer as a source of supply because we have the facilities and experience to "deliver the goods" when you want it - - as you want it.

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Stauffer CHEMICAL SINCE 1885

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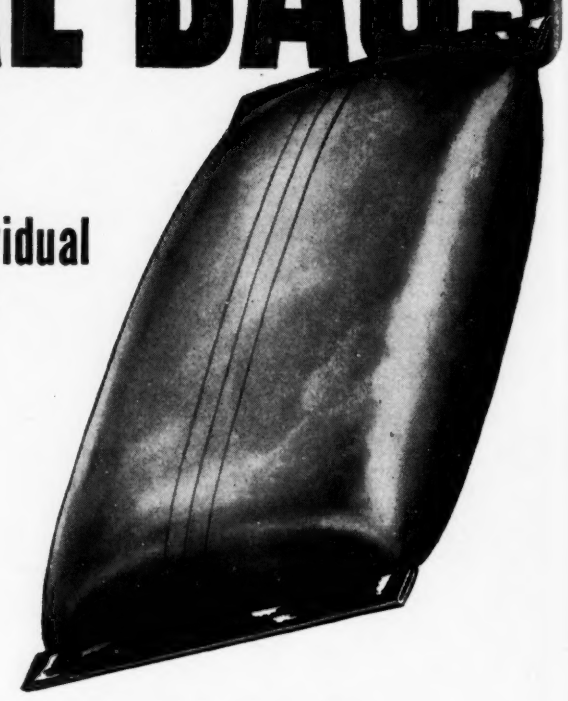

SENSITIVE things to pack, chemicals often require bags that keep moisture out; some require bags that keep moisture in; others require bags that let your product breathe; while still others require bags that retain desirable aromas . . . repel objectionable odors. No one bag can serve this multitude of requirements successfully. That's why it pays to entrust your packaging problems to Chase.

Chase lined and combined bags are "tailor-made" to meet many individual requirements. They come in a variety of types and sizes, they are tough and strong, and give your products maximum protection against losses from shipping and storing.

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It has to be *Right*

Alone in his "office" in the skies, the navigator makes his observations, consults his tables, plots his position. Just a line—a simple line—marks the course. But *it has to be right* . . . the success of an important mission, the return of a bomber and its crew depend on its accuracy.

Columbia chemicals have to be right, too. Frequently they are used in operations involving the conversion of raw materials. In other cases they may enter into only one phase of a complicated manufacturing process, and pass off when their task is completed. But always they must be of a standard that assures the correct form and quality of the finished product.

This is why Columbia exercises infinite care in supplying chemicals which conform to the precise needs of its customers.

PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION
GRANT BUILDING, PITTSBURGH (19), PENNSYLVANIA

Chicago • • • Boston • • • St. Louis • • • Pittsburgh • • • New York • • • Cincinnati
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COLUMBIA SPOTLIGHT

DEEPEST LIMESTONE MINE in the world—2323 feet—was sunk last year by Columbia less than two miles from its plant at Barberton, Ohio. Among its many unique features is semi-automatic hoisting which attains top speed of 2,000 feet per minute.

THE NATION is facing a highly critical situation in domestic freight transportation, the O. D. T. warns in a plea for the cooperation of every shipper. Be sure your shipping and receiving departments understand that the handling of railway equipment with all possible speed is vitally important to our war effort.

NOW IT CAN BE TOLD.. the largest Chlorine-Caustic Soda plant built as a single unit east of the Rockies—a Defense Plant Corporation project—is being operated by Columbia at Natrium, W. Va.

A REVISED EDITION of Columbia's Products Booklet is now ready for distribution. A handy reference of products, grades, package units, uses of all Columbia products. Write for free copies.

WHEN THE NATION'S rubber production no longer requires all of Columbia's production of SILENE EF, this extraordinary pigment will find its way into an amazing variety of products. To name but a few—paints, tooth powders, deodorant creams, face powders. New uses are being discovered constantly. If you'd like to turn your own laboratories loose on SILENE EF, data and samples are available on request.

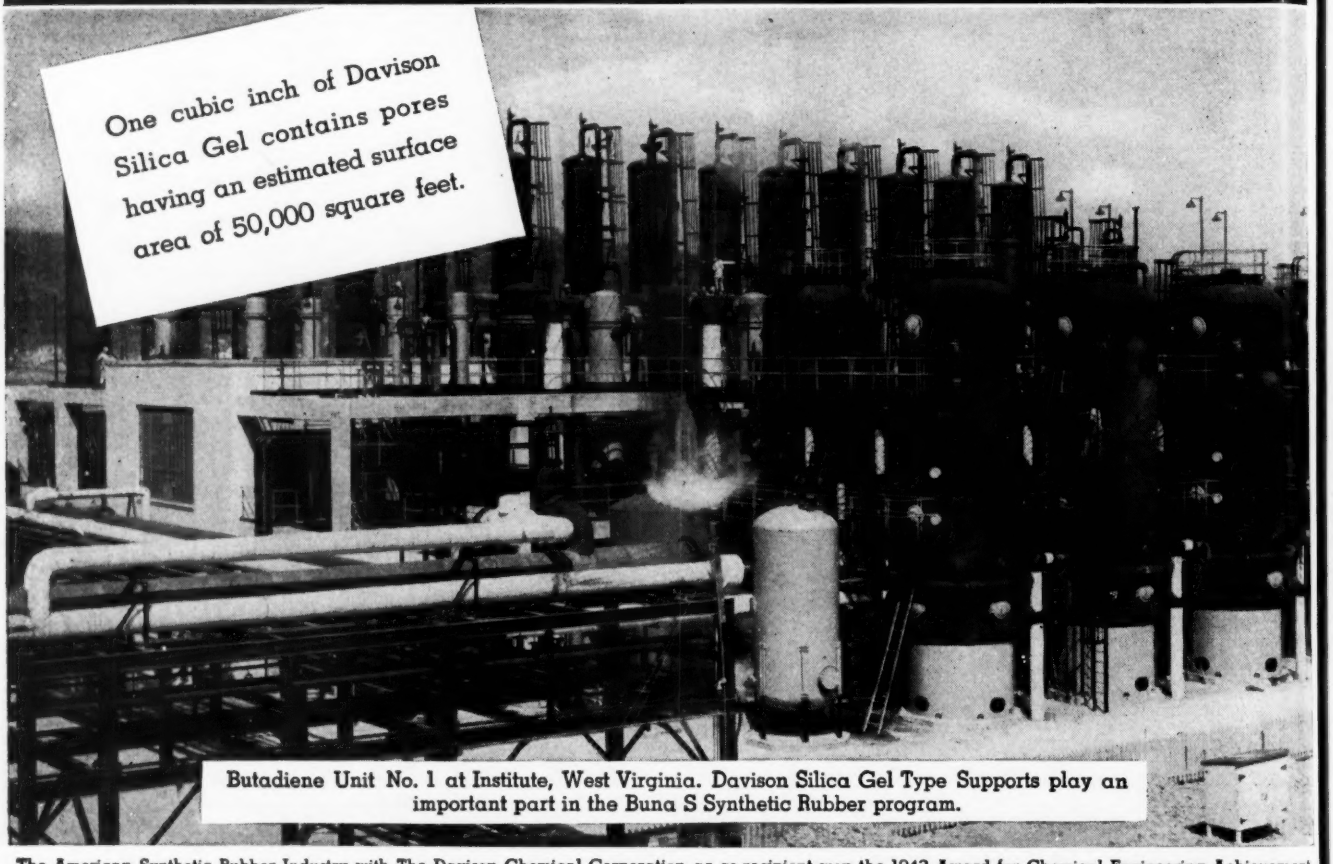
COLUMBIA CHEMICALS

Soda Ash • Caustic Soda • Liquid Chlorine • Sodium Bicarbonate • Silene EF (Hydrated Calcium Silicate) • Calcium Chloride
Soda Briquettes • Modified Sodas • Caustic Ash • Calcium Hypochlorite • Phosflake • Calcene (Precipitated Calcium Carbonate)

SURFACE AREA

IS A BASIC CONSIDERATION IN THE CHOICE OF A CATALYST SUPPORT

ASTOUNDING AREAS ARE OFFERED BY DAVISON GEL TYPE SUPPORTS



Butadiene Unit No. 1 at Institute, West Virginia. Davison Silica Gel Type Supports play an important part in the Buna S Synthetic Rubber program.

The American Synthetic Rubber Industry with The Davison Chemical Corporation as co-recipient won the 1943 Award for Chemical Engineering Achievement.

While many metallic oxides and salts act as catalytic agents, the surface of the catalyst exposed to the reagents has an important bearing on the catalytic activity.

It is possible to increase the exposed area by impregnating Davison's Gels with metallic oxides and salts that are to be used as catalysts.

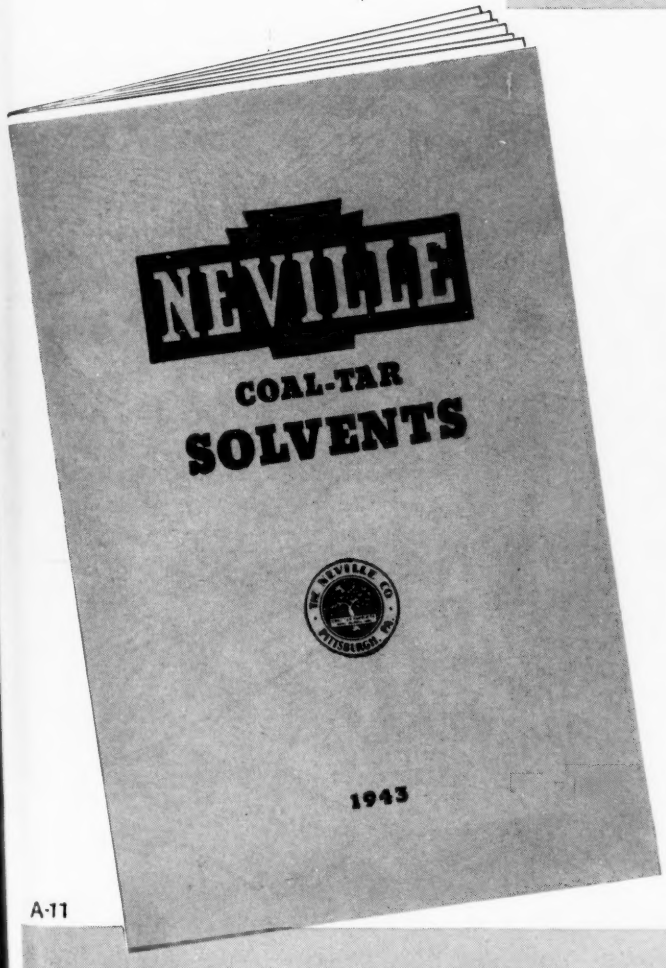
Davison experience and "know how" include numerous methods of combining active catalysts with gels.

Progress through Chemistry

THE DAVISON CHEMICAL CORPORATION

BALTIMORE 3, MARYLAND

NEVILLE *Solvents*



Experience has proved that coal-tar solvents are the most desirable for many difficult solvent problems. Neville has developed not only uniformly excellent solvents of standard distillation ranges, but also a number of new fractions. Neville offers a complete range of Coal-Tar Solvents to meet the widely varying requirements of Industry.

The grades, specifications and uses of these versatile solvents are fully described in this 40-page booklet. Write for your copy today.

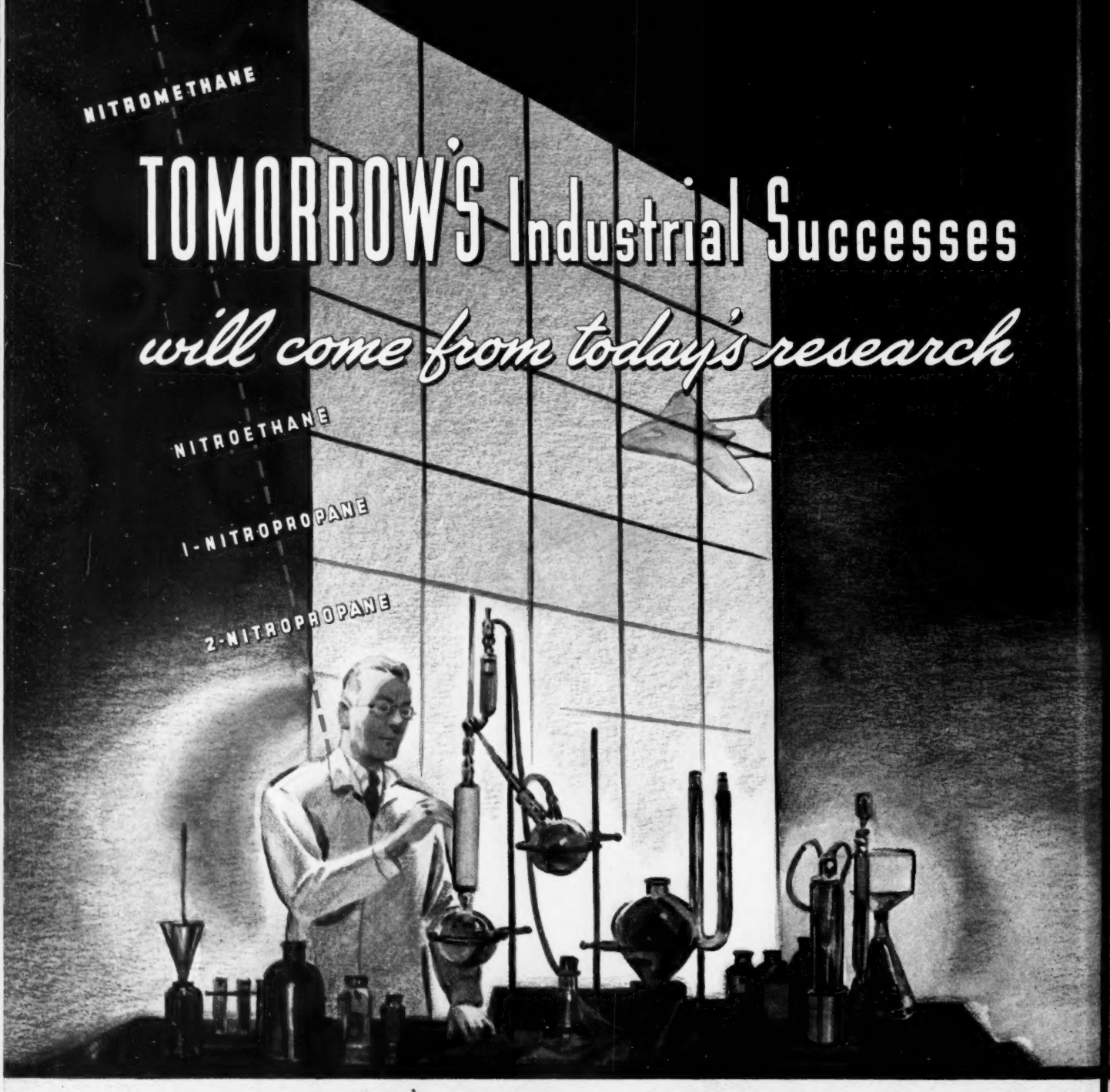
A-11

THE NEVILLE COMPANY

PITTSBURGH · PA.

Chemicals for the Nation's War Program

BENZOL • TOLUOL • XYLOL • TOLLAC • NEVSOL • CRUDE COAL-TAR SOLVENTS
HI-FLASH SOLVENTS • COUMARONE-INDENE RESINS • GUANADINE NITRATE • TAR PAINTS
RUBBER COMPOUNDING MATERIALS • WIRE ENAMEL THINNERS • DIBUTYL PHTHALATE
RECLAIMING, PLASTICIZING, NEUTRAL, CREOSOTE, AND SHINGLE STAIN OILS



Those who wish an active part in today's chemical progress have many avenues of approach . . . but none with greater possibilities than research with the Nitroparaffins. With each new discovery the horizon broadens and the field of useful application increases.

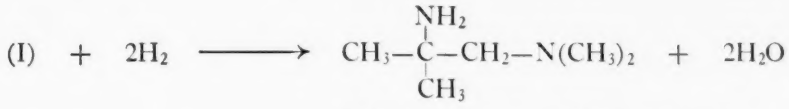
Have you tried the Nitroparaffins in your special sphere of investigation? Our Technical Service Division will gladly work with you.

THESE FIRST-STEP NP REACTIONS

taken from the technical and patent literature, lead the way to highly desired products

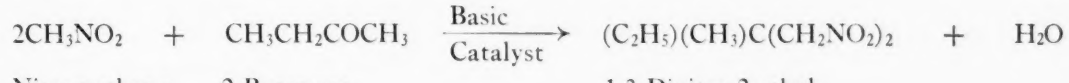
Nitroamines, capable of being reduced to diamines, are produced from the nitroparaffins by the Mannich reaction.

2-Nitropropane Formaldehyde Dimethylamine N-[2-Nitroisobutyl]dimethylamine



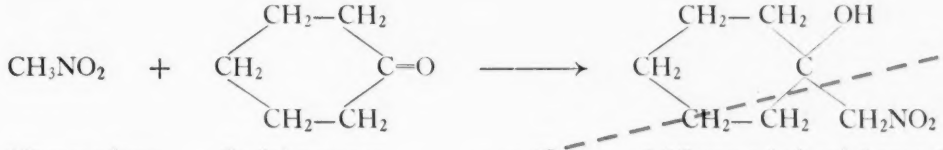
N-[2-Aminoisobutyl]dimethylamine

Dinitroparaffins are formed by the condensation of nitromethane and ketones.



Nitromethane 2-Butanone 1,3-Dinitro-2-ethyl-2-methylpropane

Cyclic nitroalcohols are obtained from the condensation of nitromethane with many cyclic ketones.



Nitromethene Cyclohexanone 1-Nitromethylcyclohexanol

COMMERCIAL SOLVENTS

Corporation

17 East 42nd Street, New York 17, N. Y.

As our armed forces advance island after island in the South Pacific, on each of these stepping stones to Tokio they encounter an enemy more dangerous than the treacherous Japs.

It is water-borne disease. In past wars this killer has caused more casualties than the most deadly weapons devised by man!

Today, chlorine and its compounds help to protect our fighting men against many forms of this menace. And for this important purpose, and other vital uses, Penn Salt supplies the army and navy with this important chemical.

In camps, during troop transportation, and in the field, chlorine sanitizes water for drinking and bathing. Its compounds serve bactericidal uses in field and base hospitals—in laundries, for bleaching and sanitizing purposes—in footbaths as a safeguard against common fungus infections.

These needs take a great deal of the Penn Salt output of chlorine and chlorine compounds. However, our concentration on this urgent wartime service has provided us with a fund of experience and increased facilities which will be turned to serving our peacetime customers even more satisfactorily when the war is won.

SOME OF THE PRODUCTS MANUFACTURED BY PENN SALT:

ACIDS, Sulphuric, Muriatic, Mixed Acids, Hydrofluoric, Hydrofluosilicic, Nitric • AMMONIA • ALUM, Sulfate of Alumina • HYDRATE OF ALUMINA • BLEACHING POWDER • AMMONIA, Anhydrous and Aqua • CARBON BISULPHIDE • CARBON TETRACHLORIDE • CAUSTIC SODA • CORROSION-RESISTING CEMENTS • LIQUID CHLORINE • FERRIC CHLORIDE • FLUORIDES AND FLUOSILICATES • HYDROGEN PEROXIDE • *KRYOLITH Flux and Opacifier • *KRYOCIDE Insecticide • *ORTHOSIL AND *PENNSALT METAL CLEANERS • SAL AMMONIAC • SODIUM ALUMINATE.

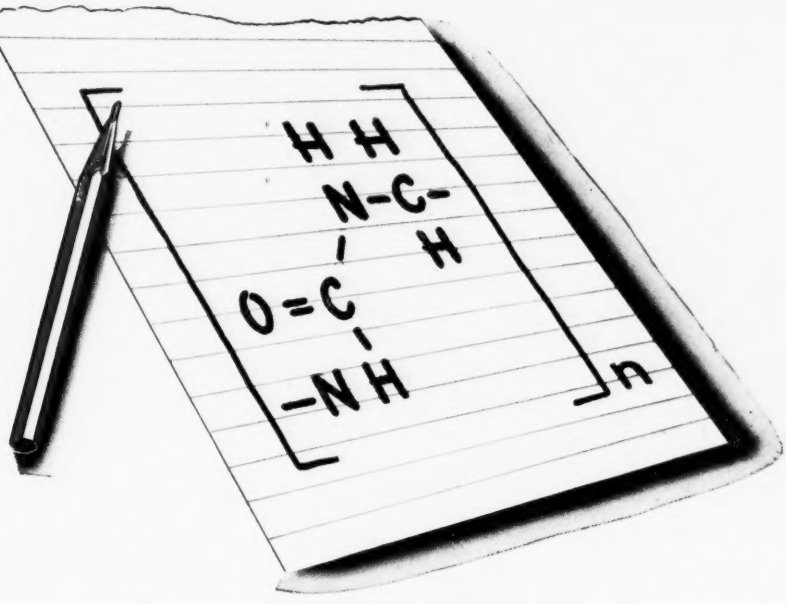
*Trade-marks Reg. U. S. Pat. Off.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.

New York • Chicago • St. Louis • Pittsburgh • Minneapolis • Wyandotte • Tacoma

Plenty of jobs waiting for these "WAR VETERANS"



The UFORMITES, synthetic resins, will be busier than ever in postwar, speeding the processing or enhancing the sales value of such diversified things as washing machines, paperboard containers and prefabricated houses.

AS hard, wear-resistant coatings . . . completely weatherproof finishes . . . multi-purpose bonding glues, the UFORMITES are "all out" today in vital war production. But there will be plenty of work when peace returns for these urea formaldehyde resins developed by The Resinous Products & Chemical Company.

Some of this postwar work will be in jobs, of course, that the UFORMITES have been doing for years—coatings, for example, for refrigerators and washing machines. But many of tomorrow's uses for this versatile family of synthetic resins will be new, *born of war.*

What the UFORMITES can do for manufacturers of paper, home appliances, prefabricated houses and other things for peacetime living should be investigated today.

The UFORMITES are just one of the many types of synthetic resins developed by The Resinous Products & Chemical Company. One or more of these materials may be the answer to your problem. We'll be glad to discuss with you their many potential applications.

RESIN DEVELOPMENT SPECIALISTS

The Resinous Products & Chemical Company has been the pioneer and is today the leader in the development of new applications for these resins:

RESIN ADHESIVES
COATINGS RESINS
PAPER RESINS
ION EXCHANGE RESINS
PLASTICIZING AND MODIFYING RESINS

If you want assistance in any of these synthetic resin applications, our technical staff will be glad to study your problem without obligation.

3 Awards to The Resinous Products & Chemical Company and its associated firms, Rohm & Haas Company and Charles Lennig & Company.

THE RESINOUS PRODUCTS & CHEMICAL COMPANY

WASHINGTON SQUARE, PHILADELPHIA, PA.

Water for the folks of China

AND CHEMICAL MIXTURES FOR THE PROCESSING INDUSTRIES

A most significant postwar project is sanitation and improved water supply for backward people.

Sanitation will improve health which will increase production. This, in turn, will raise economic levels and contribute to social and political contentment.

In all this and more, WILSON *Pulsafeeders* will play their part because Government agencies and leading technicians, thoroughly conversant with their efficiency and dependability, already have specified thousands of them for service the world over.

It's a question whether WILSON *Pulsafeeders* find their greatest usefulness in water supply and sewage treatment, or in laboratories and the processing industries.

One thing is certain, wherever they are placed, they perform with precision and dependability, regardless of capacity.

Precision is assured by manually adjusted flow control to a constant, predetermined rate of feed for a single liquid or for several liquids. Accuracy remains constant regardless of volume or variety, and is guaranteed at better than ⅛th of 1%.

Durability results from absence of packing glands, breakable diaphragms and contact between operating parts and the chemicals being handled.

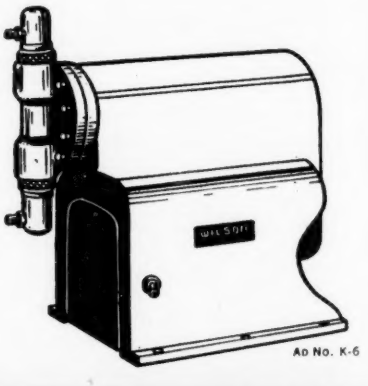
Efficiency is assured through positive displacement and the simplification which is a Wilson characteristic.

Capacities range from flows of one cubic centimeter per hour to four hundred gallons without variation in accuracy.

Low Maintenance and freedom from frequent shutdowns are assured.

WILSON *Pulsafeeders* have been proved superior in many fields for feeding single or multi-flows against high or low pressures.

They fill every requirement in chemical proportioning, in food and other processing industries, in research laboratories where accuracy is a "must", for water and sewage treatment with such chemicals as hypochlorite, alum, soda ash, calgon, lime, iron salts, acids and ammonia, and where difficult problems are met, they handle dilute acids, volatile chemicals, slurries and high or low viscosities with equal facility.



AD NO. K-6

***YOUR INQUIRY** is invited and our reply will be given in as much detail as your statement of requirements permits.*

***OUR SERVICE**, because of acquisition of Clevon Products Co. (Estd. 1903) includes supply of Automatic Liquid Filling Machines.*

WILSON CHEMICAL FEEDERS, INC.

215 CLINTON STREET (P. O. Box 998) BUFFALO 4, N. Y.

ESTABLISHED 1923 . . . WITH EXPERIENCE IN ALLIED LINES SINCE 1914

CHEMICAL EXACTNESS helps build a new industry

SYNTHETIC RUBBER

During 1944, the nation plans to produce 800,000 tons or more of synthetic rubber.

This vast new industry—created out of the exigencies of wartimes—is a result of the *alertness* of American science and research workers.

In the near future, chemists expect to produce synthetic rubber for many uses with qualities *far superior* to nature's product. Tires, for instance, in the not-too-distant future, may possibly give 100,000 miles or more of trouble-free service.

Baker is playing its important part in contributing chemicals to exacting specifications, for use in various types of synthetic rubber production. Here, chemical exactness is demanded.

This is only one of many instances where measured *purity*, as exemplified by Baker Chemicals, has increased efficiency in today's forward march of industry.

Baker's Chemicals (purity by the ton) have been supplied to many manufacturing concerns for the manufacture or processing of many products.

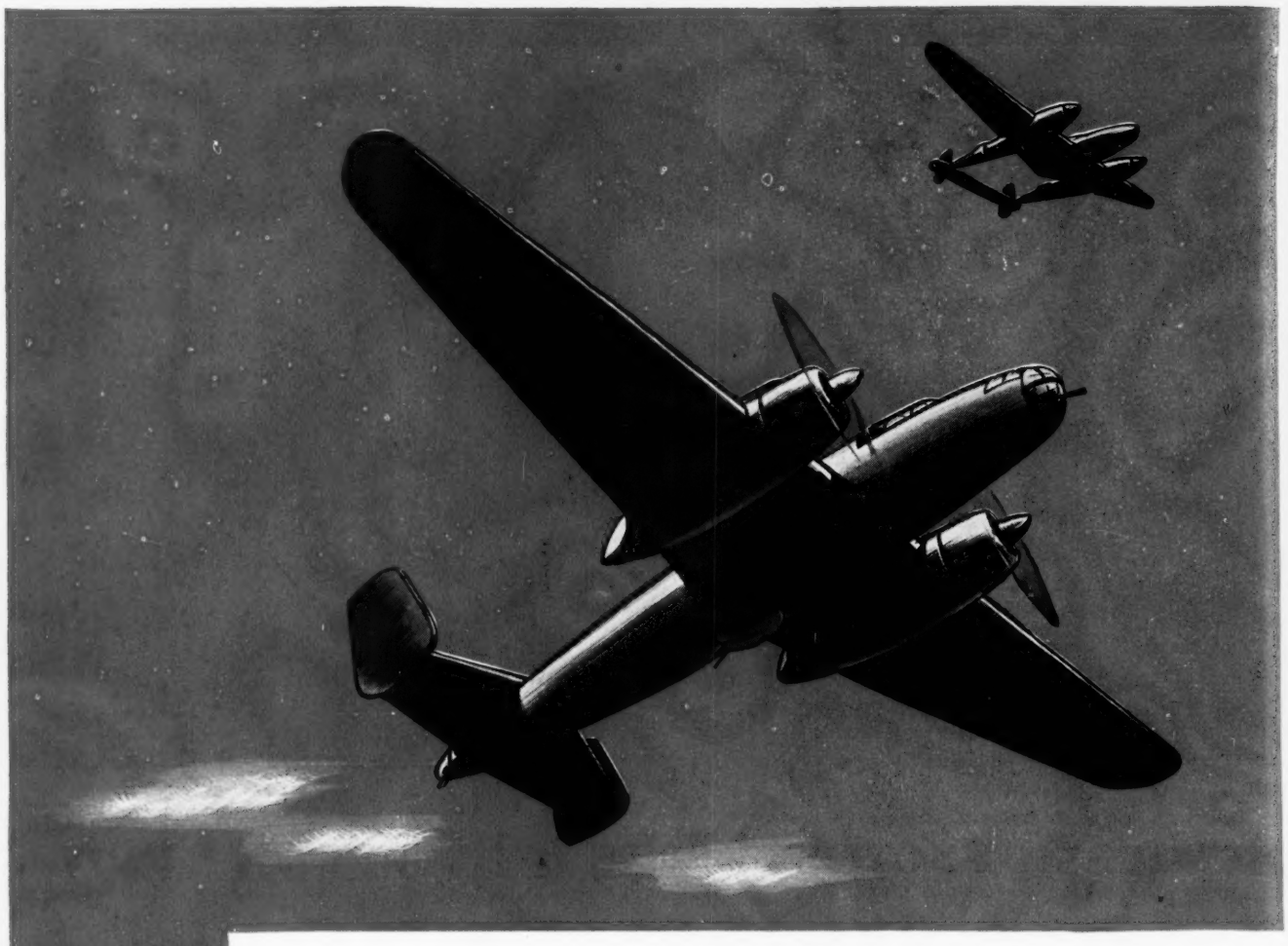
If you have special chemical requirements for war-production products, we invite you to discuss your needs in confidence with Baker.

J. T. Baker Chemical Co., ***Executive Offices and Plant:*** **Phillipsburg, N. J.**
Branch Offices: **New York, Philadelphia and Chicago.**

Baker's Chemicals

C. P. ANALYZED • FINE • INDUSTRIAL

Baker's



TODAY'S SIGNS FORECAST

It will be a changed world. Some may think that the nation's chemical and petro-chemical equipment for war will serve adequately for the needs of peace. But still greater accomplishments are possible. And the inevitable struggle for competitive post-war advantage will certainly develop them.

Good as war-built plants and equipment may be, it is not enough to rest on their pattern. Reconversion or refitting for peacetime requirements calls for study *now*.

Adding to the experience of a long pre-war career, Badger has learned much during the past three years of handling many construction projects —small and large—for the manufacture of high octane gasoline, synthetic rubber stocks, explosives, and all sorts of chemicals new and old.

PROCESS ENGINEERS AND CONSTRUCTORS FOR THE

TOMORROW'S NEEDS

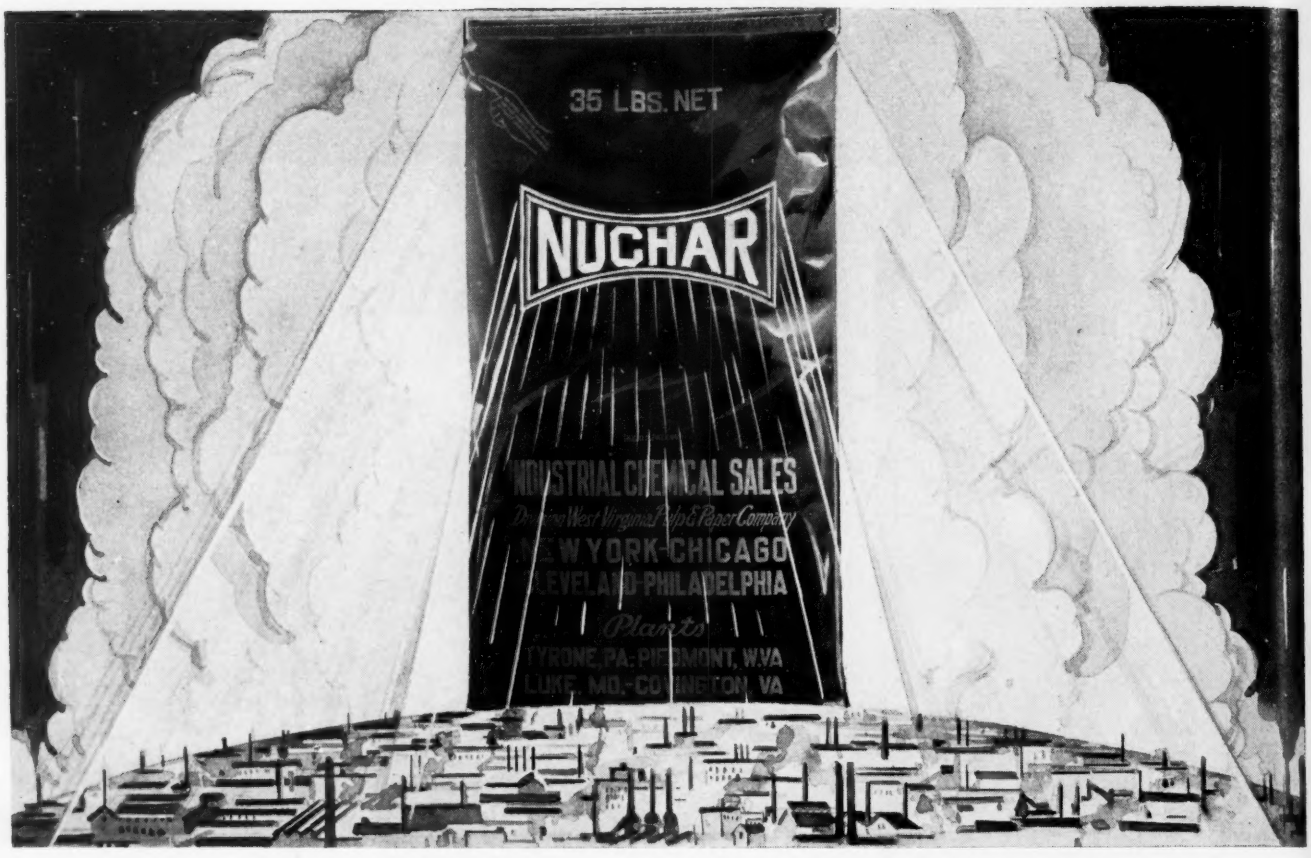
This rich experience is available to you in change-over, modernization or new-plant undertakings. Badger is equipped to handle *everything*—either under sole responsibility or in co-operation with your own organization . . . from process, design and construction engineering, to material procurement, to labor employment and supervision, down to test-run operation. Badger is open for discussions now.

E. B. Badger & SONS CO.

BOSTON **Est. 1841**

NEW YORK • PHILADELPHIA • SAN FRANCISCO • LONDON

CHEMICAL, PETROLEUM AND PETRO-CHEMICAL INDUSTRIES



NUCHAR - The Miracle of Purification !

Nuchar Active Carbon is the miracle package of purification. Nuchar has found wide acceptance in the treatment of many chemical products - - - including some of the newer developments in the chemical field such as the purification and re-crystallization of sulfa drugs, in the production of penicillin, atabrine, glycerine, and such acids as citric, lactic, phosphoric, tartaric and others.

Chemical producers are finding many new uses for Nuchar, because they recognize in its application a thoroughly effective method of purification by adsorption.

Your technical staff will find active carbon a useful tool in your processes. Consult with us regarding the grade of Nuchar best fitted to your needs and we will send you a generous working sample.

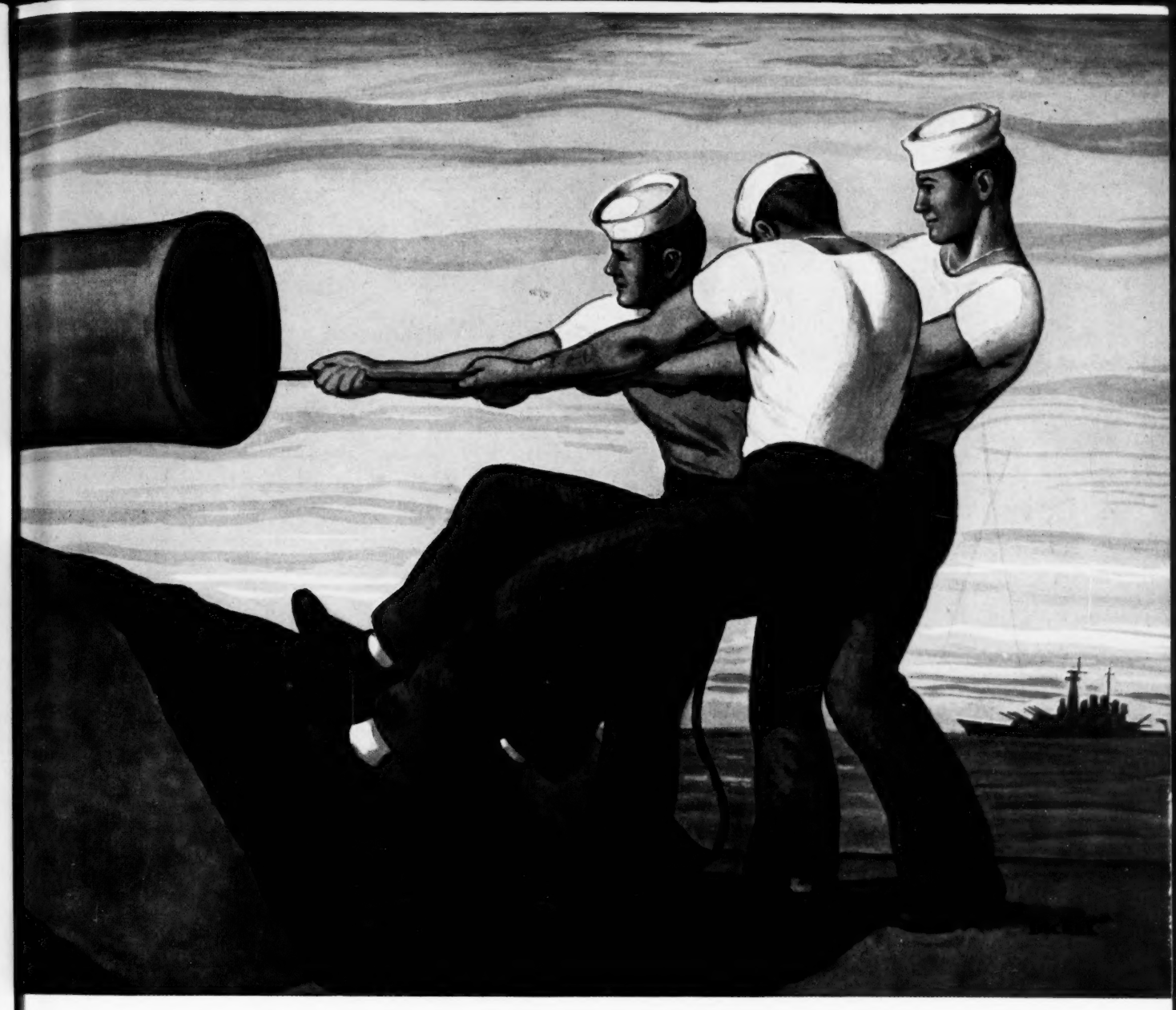
Nuchar Active Carbons ★ *Abietic Acid* ★ *Snow Top Precipitated Calcium Carbonate* ★ *Liquid Caustic Soda* ★ *Chlorine* ★ *Lignin* ★ *Liqro Crude Tall Oil* ★ *Indusoil Distilled Tall Oil* ★ *Tall Oil Pitch* ★ *Sulphate Wood Turpentine*

NUCHAR

INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP & PAPER COMPANY

230 PARK AVENUE, NEW YORK 17, N.Y. · 35 E. WACKER DRIVE, CHICAGO 1, ILLINOIS · 748 PUBLIC LEDGER BLDG., PHILADELPHIA 6, PA. · 844 LEADER BLDG., CLEVELAND 14, OHIO



Clean as a Hound's Tooth . . .

When American guns go into action—from our great naval batteries down to the carbine carried by a leatherneck—new records in marksmanship are hung up. For Uncle Sam's fighting men are the world's most accurate gunners. Personal pride in keeping their weapons "clean as a hound's tooth," inside and out, contributes much to this reputation.

Even the so-called "little jobs" can be important to victory—and Sharples Chemicals play their part in helping to keep guns internally spotless and fit. The solvent power of Sharples Amyl Alcohols has gone to war in rifle cleaning compounds.

On every front, including the one of production, Sharples Synthetic Organic Chemicals are working to help bring a victorious end to the conflict and to hasten the day our soldiers can return home. Sharples Research, through concentrating on war problems today, is gaining experience and knowledge necessary for serving tomorrow's industrial demands.

SHARPLES CHEMICALS AT WAR

AMYL ALCOHOLS • AMYL ACETATE
AMYL PHENOLS AND DERIVATIVES
ALKYLAMINES AND DERIVATIVES
ALKYLAMINOETHANOLS
ETHYL ANILINE • CHLOROPENTANES
AMYL NAPHTHALENES
AMYL MERCAPTAN

ARMY E NAVY

SHARPLES CHEMICALS INC.

Philadelphia *Chicago* *New York*

BUY WAR BONDS ...REGULARLY!

Trained Men to Give Practical Advice where Synthetic Organic Chemicals are Used

IN THE PLANT – Our technical representatives frequently can give advice on customer problems involving solvents, emulsifying agents, wetting agents, plasticizers, coupling agents, and chemical intermediates. They are thoroughly familiar with the properties, applications, and uses of the more than 160 chemicals we make.

IN THE LABORATORY – They can give you information on the many new chemicals we have announced for research study. And they can tell you about recent applications of older products that you may be using. These representatives are chemists and chemical engineers who have had experience in our research laboratories and understand research problems and techniques.

IN THE OFFICE – In your chemical purchasing problems as well, our representatives can be of service . . . advising on price, shipping, and priority regulations, the routing of orders, and the availability of chemicals we make, or their replacements. These men are located in all the major chemical-consuming cities throughout the country.

BUY UNITED STATES WAR BONDS AND STAMPS

CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC **New York 17, N. Y.**

PRODUCERS OF SYNTHETIC ORGANIC CHEMICALS

Permanent Piping

PORCELAIN FITTINGS

The use of high-grade Wet Process Porcelain for the handling of chemicals and acids, is proving its unequalled value daily.

The use of our Chemical Porcelain pipe and fittings is very economical and permanent because it is highly vitrified, non-absorbent and practically indestructible.

It is impervious to the action of chemicals and acids with the exception of hydrofluoric.

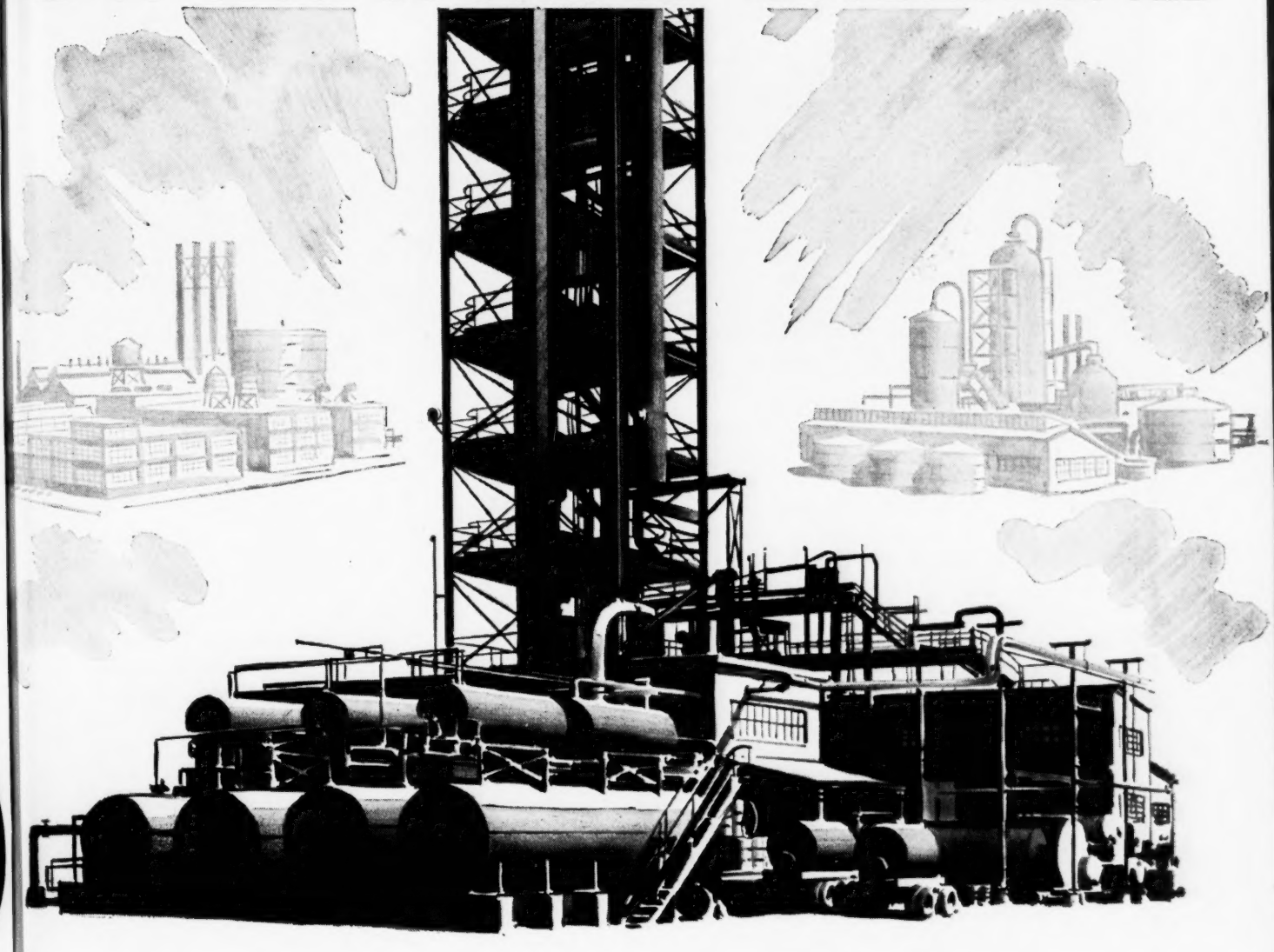
The inside and outside of all pipe is glazed white.

In the installation of our piping, we suggest the use of 1/32" thick asbestos graphite impregnated gaskets.

Get a copy of this book now. No cost or obligation. Send for it today.

Illinois Electric Porcelain
Macomb **Illinois**

OW INDUSTRIAL CHEMICALS



. . . shipping to industry from three great plants

MICHIGAN • TEXAS • CALIFORNIA

Wherever you are, you are not very far from a dependable source of supply for Dow Industrial Chemicals. And, regardless of how many plants you operate, the traditional high quality of Dow Chemicals is instantly available.

Requests for information on any of the chemicals listed below will receive prompt attention.

DOW INDUSTRIAL CHEMICALS

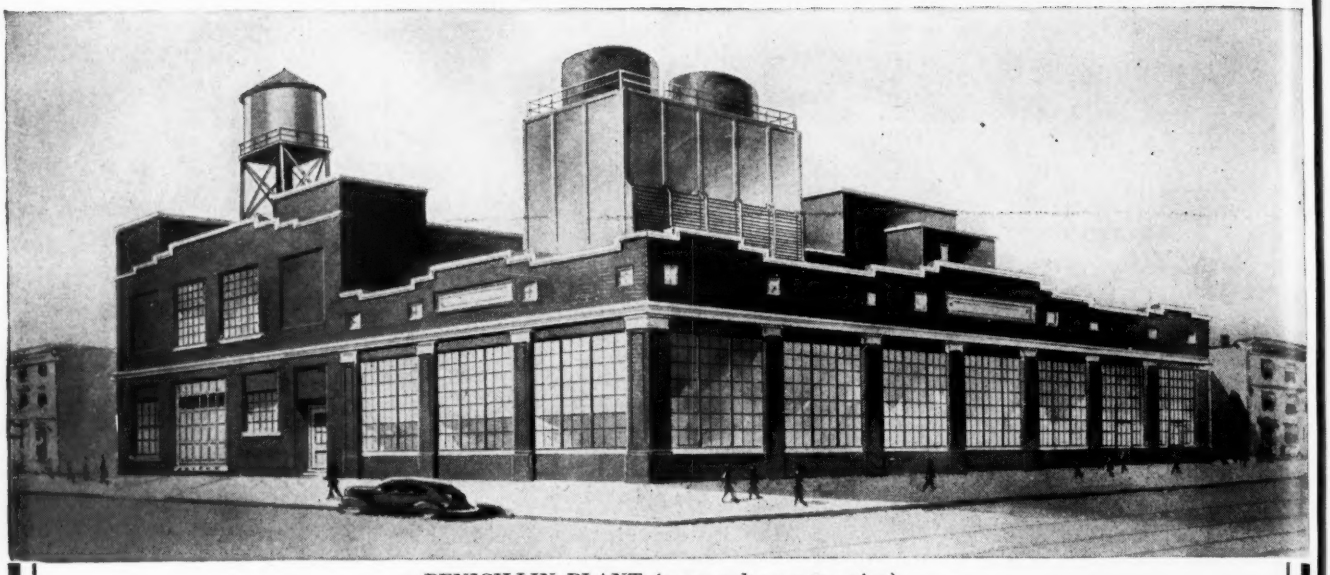
Caustic Soda • Aniline Oils • Phenol • Glycols • Hydrochloric Acid • Chlorides • Epsom Salt • and more than 75 others.

HE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York • Boston • Philadelphia • Washington • Cleveland • Chicago • St. Louis • Houston
San Francisco • Los Angeles • Seattle

DOW

CHEMICALS INDISPENSABLE
TO INDUSTRY AND VICTORY



PENICILLIN PLANT (*now under construction*)

PENICILLIN

Using the experience gained in some forty years of research in the production of chemicals of industrial importance by mycological and fermentative processes, all available members of our research staff have, for more than two years, been devoting their entire energies to the development of methods for the production of Penicillin.

Because of the urgent need for this powerful bacteriostatic agent in the present emergency, we began laboratory production early in 1942. This was increased to a pilot plant scale as soon as possible and in the summer of this year, at the request of the government, we started the construction of an entirely new plant to be devoted exclusively to the large-scale production of Penicillin.

This construction is being rushed with all possible speed, and the plant is expected to be in operation shortly after the turn of the year.

Since present supplies of Penicillin are far from sufficient to meet the acute needs of our armed forces, the entire output of all manufacturers has been placed under allocation. Although by far the greater part of our output goes directly to the Army and the Navy, limited quantities are allotted by the War Production Board to the Office of Scientific Research and Development for use in essential clinical investigations, but it is not available for general distribution. Even though our new plant will increase our output manyfold, we do not anticipate that the supply will be sufficient to allow general civilian use for some time to come. Chas. Pfizer & Co., Inc., 81 Maiden Lane, New York 7, N. Y. — 444 W. Grand Ave., Chicago, Ill.

PFIZER QUALITY

Chemicals For Those Who Serve Man's Well-Being

Manufacturing Chemists · Established 1849

JOIN THE MARCH OF DIMES
FIGHT INFANTILE PARALYSIS
JANUARY 14-31

got a problem?

take it to America's leading producer of synthetic resins

Not so many years ago, paint and ink formulators looked toward the day when scientifically standardized chemical bases would replace natural resins of uncertain quality and results.

RCI responded with entirely new synthetic resins and practical research aid, which vastly increased the rate of progress in these fields and have found wide application in many other industries.

Since then RCI has expanded its production to cover practically the entire field of resins. Today RCI produces a full line of phenolic laminating resins, as well as waterproof adhesives, alkyds, phenolics, ureas, processed copals and ester gums.

Moreover, the calibre and experience of RCI research personnel has kept in step. Working with manufacturers and independently, this large staff has delved into, and solved, production and formulating problems of almost every kind.

Perhaps you have a problem that synthetic resins and unexcelled "know-how" can answer. Why not take it straight to headquarters?

WORLD-WIDE DISTRIBUTION

REICHHOLD CHEMICALS, INC.

General Offices and Main Plant, Detroit, Michigan

Other plants: Brooklyn, New York • Elizabeth, New Jersey • South San Francisco, California • Tuscaloosa, Alabama • Liverpool, England • Sydney, Australia

SYNTHETIC RESINS • CHEMICAL COLORS • INDUSTRIAL PLASTICS • INDUSTRIAL CHEMICALS • CHEMURGIC RUBBER

crystal gazing with PQ silicates . . .

PLANNERS of postwar products and processes, look into our "crystal"—this *soluble* glass. You'll see a variety of useful arts now being practiced in vital industries with the silicates, colloidal and crystalline. Also you'll find others still fresh from the patent office, like the ones listed below.

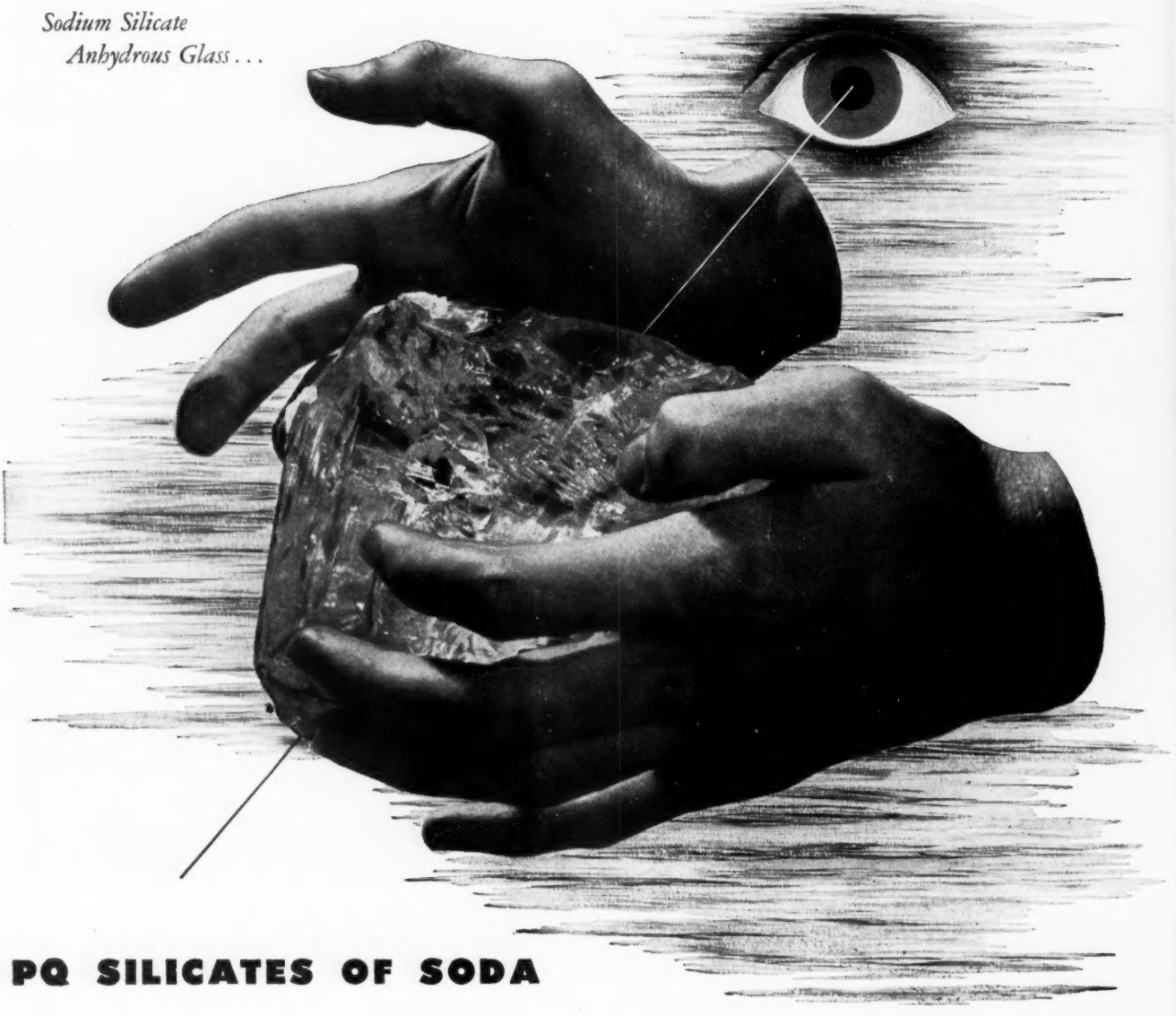
Some uses are still in the research stage, for the fifty different soluble silicates available from PQ offer properties of colloids, adhesives, detergents, binders at very low cost. Their efficiency and economy are worth investigating. Write for a copy of Bul. 17-4, which describes PQ publications on silicates of soda and their applications.

Vulcanizing neoprene: Three parts by weight of sodium silicate prevents premature vulcanizing during milling but does not check vulcanization at the point where it is properly carried out.

Fire-Protecting Paint: Sodium silicate, combined with pyroantimonic acid in a colloid mill and subsequently with such pigments, oils, and resins as desired, furnishes a paint suitable for external application.

PHILADELPHIA QUARTZ CO.
Dept. B, 119 South Third Street, Phila. 6, Pa.
Chicago Sales Office: 205 West Wacker Drive

Sodium Silicate
Anhydrous Glass . . .



PQ SILICATES OF SODA

WORKS: Anderson, Ind. • Baltimore, Md. • Chester, Pa. • Gardenville, N. Y. • Jeffersonville, Ind. • Kansas City, Kans. • Rahway, N. J. • St. Louis, Mo. • Utica, Ill.

SHELL CHEMICAL helps keep him dry

Methyl ethyl ketone is the solvent for vinylite resins which waterproof Army raincoats. Shell's ammonia fights on both war and food fronts. Every product on our list is doing an important war job.

OFFICIAL U.S. NAVY PHOTOGRAPH

PRODUCTS OF SHELL CHEMICAL

Methyl Ethyl Ketone
Ammonia
Butadiene
Acetone
Diacetone
Isopropyl Alcohol
Methyl Isobutyl Ketone
Mesityl Oxide
Isopropyl Ether
Secondary Butyl Alcohol
Tertiary Butyl Alcohol
Allyl Chloride
Allyl Alcohol

ISN'T IT LOGICAL that our products which are doing so many jobs for war industry today may be useful in the products you are planning right now for peace? We will welcome inquiries regarding any of them, even though at present they are all on allocation.

When war came, SHELL CHEMICAL was ready with many products vital to the national welfare. We will also be ready to supply your requirements when peace is here again.

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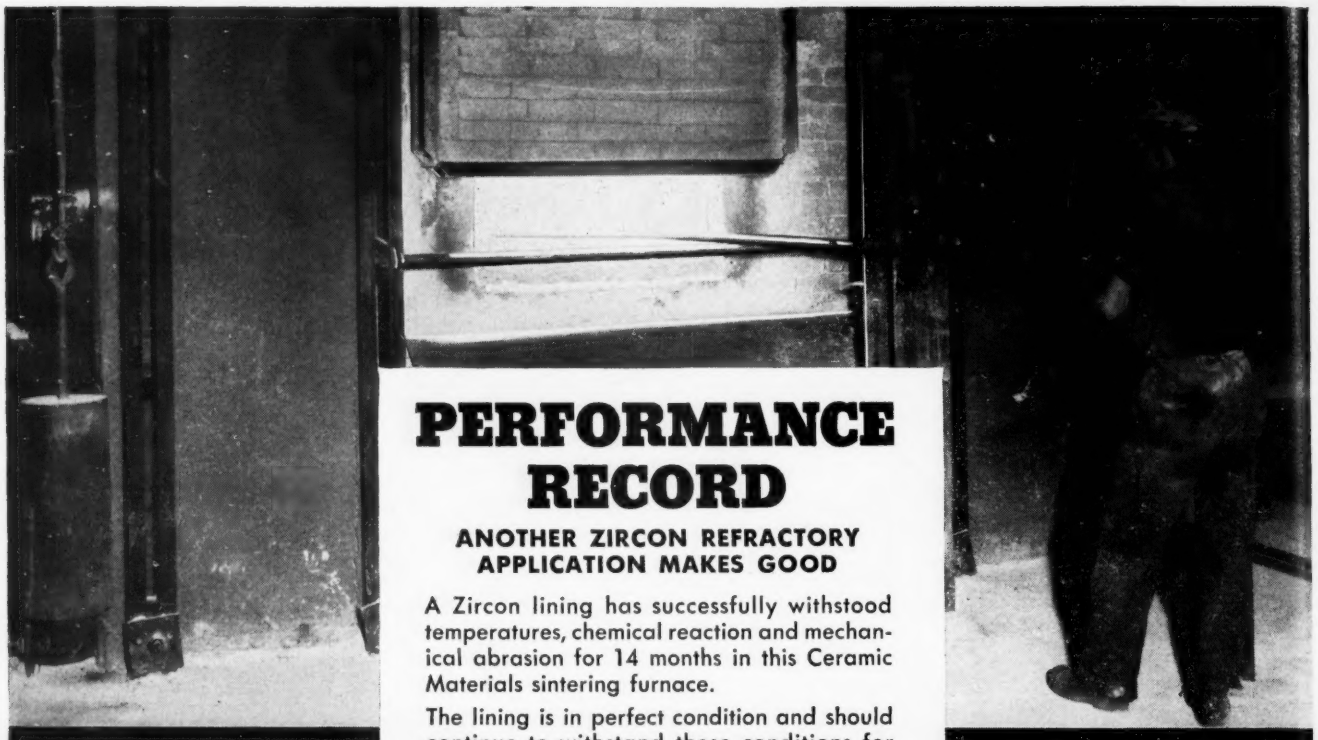

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ANOTHER ZIRCON REFRACTORY APPLICATION MAKES GOOD

A Zircon lining has successfully withstood temperatures, chemical reaction and mechanical abrasion for 14 months in this Ceramic Materials sintering furnace.

The lining is in perfect condition and should continue to withstand these conditions for many more months.

An experienced staff of field engineers, located in centralized parts of the country, is available to you for consultation on *your* Refractory problems.

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GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.
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KNOCKING at the Chemist's Door

Thirteen new chemicals developed by Hooker Electrochemical Company are waiting for adventure. Consider their properties—send for research samples. It may be that one or more of these chemicals are what you have been seeking.

CHLORPARAFFIN RESIN

Light colored, almost white, brittle resin, softening at about 100° C. and remaining very viscous at 140° C. Contains 76 to 78% Chlorine. This product is more stable than other chlorinated paraffins containing lesser amounts of Chlorine. Suggested uses: Resin for paints to withstand severe weather conditions.

HEXACHLORETHANE

Molecular weight	237
Chemical formula	C_2Cl_6
Melting point	186° C.
Boiling point	186° C.
Color	White crystals
Odor	Mild camphor-like

Insoluble in water, soluble in alcohol and carbon tetrachloride. Suggested uses: pyrotechnic compositions; insecticide; plasticizer and chlorinating agent.

PELARGONYL CHLORIDE

Molecular weight	176.5
Chemical formula	$CH_3(CH_2)_7COCl$
Specific gravity	0.955 at 20°/15.5° C.
Boiling range	80–115° C. at 25 mm., 170–220° C. at 760 mm.
Color	Colorless to light yellow

Is hydrolyzed by water; reacts with alcohols to produce esters, soluble in ether. Suggested uses: intermediate to produce esters for plasticizers; to produce the peroxide for polymerization catalyst.

METHYL PENTACHLOR STEARATE

Molecular weight	470 (approximate)
Chemical formula	$C_{17}H_{30}Cl_5COOCH_3$ (approximate)
Specific gravity	1.200 at 25°/15.5° C.
Color	Clear yellow to deep reddish brown

Insoluble in water, soluble in hydrocarbons. Suggested uses: plasticizer for polyvinyl chloride films to impart flexibility at low temperatures and to increase fire resistance; plasticizer for other film-forming materials.

CHLORPROPANE WAX 130

Molecular weight	320
Chemical formula	$CCl_3CCl_2CCl_3$
Softening point	110 to 120° C.
Boiling range	210 to 270° C.
Color	White crystalline wax
Odor	Mild camphor-like

Insoluble in water, soluble in alcohol, ether and chlorinated solvents. Suggested uses: plasticizer; dielectric wax; pyrotechnic compositions; lubricant to withstand chemical attack.

HEXACHLORPROPYLENE
(Perchlorpropylene)

Molecular weight	249
Chemical formula	$CCl_3–CCl=CCl_2$
Boiling range	205 to 215° C.
Specific gravity	1.76 to 1.78 at 25°/15.5° C.
Color	Water white
Odor	Mild

Insoluble in water; miscible with alcohol, ether and chlorinated solvents. Suggested uses: solvent and plasticizer for rubber and other polymeric materials; non-flammable hydraulic fluid.

CHLORPROPANE LIQUID 170

Molecular weight	268.3 (average)
Chemical formula	$C_3H_2Cl_6$ and C_3HCl_7
Boiling range	185° to 250° C.
Specific gravity	1.70 to 1.75 at 25°/15.5° C.
Color	Water white

Insoluble in water; miscible with alcohol, ether and chlorinated solvents. Viscous liquid at temperatures below −50° C. Suggested uses: plasticizer; dielectric wax; pyrotechnic compositions; lubricant to withstand chemical attack.

HEXACHLORBENZENE

Molecular weight	284.7
Chemical formula	C_6Cl_6
Melting point	230° C.
Color	White to cream

Insoluble in water, soluble in carbon tetrachloride, monochlorbenzene, toluene. Suggested uses: pyrotechnic compositions; ingredient of water proofing and flame proofing compounds.

LAURYL CHLORIDE
(Dodecyl Chloride)

Molecular weight	213 (average)
Chemical formula	$C_{12}H_{25}Cl$ (approximate)
Specific gravity	0.8618 at 25°/15.5° C.
Color	Light yellow

Insoluble in water, soluble in organic solvents. Suggested uses: production of esters for plasticizers.

SODIUM TETRASULFIDE

Molecular weight	174
Chemical formula	Na_2S_4
Specific gravity (40% solution)	1.335 at 20°/15.5° C.
Color	Clear, deep red water solution

Suggested uses: soaking of hides and skins prior to unhairing; reduction organic nitro bodies; insecticide and fungicide for fruit tree spray; ore flotation reagent; reduction of cyanide plating baths; manufacture of sulfur dyes.

HEXACHLORBUTADIENE

Molecular weight	261
Chemical formula	$CCl_2=CCl–CCl=CCl_2$
Melting point	−20 to −25° C.
Boiling range	210 to 220° C.
Specific gravity	1.65 to 1.70 at 25°/15.5° C.
Color	Water white

Insoluble in water; miscible with alcohol, ether, chlorinated organic solvents. Chemical properties: highly stable, is not easily hydrolyzed by water or mild alkalies. Suggested uses: solvent for rubber, synthetic rubber and other polymeric substances; high boiling non-flammable solvent; non-flammable heat transfer liquid; transformer fluid and hydraulic fluid.

LAURYL MERCAPTAN

Molecular weight	211 (average)
Chemical formula	$C_{12}H_{25}SH$ (approximate)
Specific gravity	0.8420 at 25°/15.5° C.
Boiling range	125 to 225° at 15 mm.
Color	Water white

Insoluble in water, soluble in organic solvents. Suggested uses: catalyst in the production of copolymers such as Buna S.

TETRA HYDRO FURFURYL OLEATE

Molecular weight	366.5
Chemical formula	$CH_3(CH_2)_7CH:CH(CH_2)_7COOCH_2OC_4H_7$
Specific gravity	0.926 at 15.5°/15.5° C.
Refractive index	1.4640
Color	Yellow to light brown

Insoluble in water; soluble in alcohols, esters, ketones, hydrocarbons, and chlorinated solvents. Suggested uses: plasticizer for polyvinyl chloride films to impart flexibility at low temperatures; plasticizer for other film-forming materials.

KEEP ON BUYING WAR BONDS

If additional information is desired, write our Dept. I-1

HOOKER ELECTROCHEMICAL COMPANY

NIAGARA FALLS, N. Y.

New York, N. Y. Tacoma, Wash. Wilmington, Calif.

ARMY E NAVY

HOOKER ELECTROCHEMICAL COMPANY

HOOKER CHEMICALS

4847

American industry has had to periodically reformulate many of its products, because of foreign markets affecting the supply of raw materials, but we are now learning through scientific research to replace many of the raw materials supplied only from abroad.

An outstanding example of this trend is the development and production of RAPOIL-S, a domestic oil derived from the non-drying low iodine value portions of Sardine Oils, that is fast replacing imported Rapeseed Oil.

Other interesting products of the HARDESTY Domestic Oil Division are HARDESTOILS—drying oils derived from domestic Linseed and Sardine Oils that improve the quality of varnishes and lower vehicle costs.

Summarized results of commercial formulation with these products are now available in our technical bulletins.

Other Hardesty Products

Stearic Acid
Red Oil • Glycerine
Hydrogenized Fatty Acids
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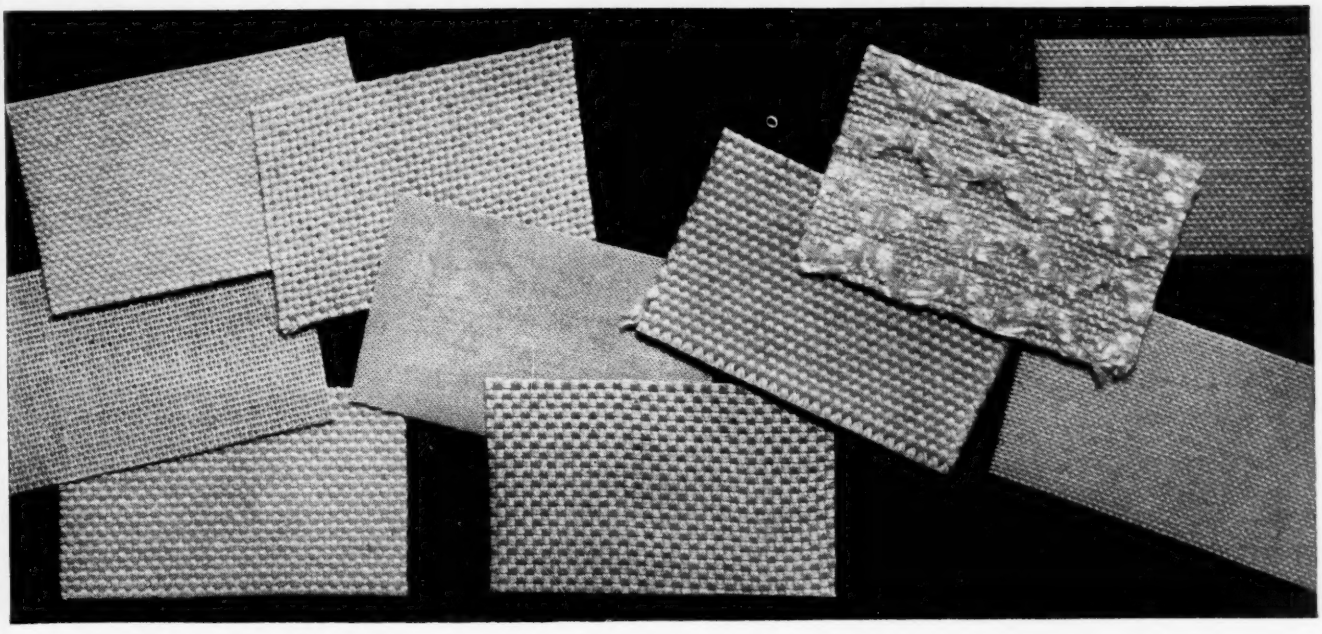
Fabrics for the Plastics of Tomorrow



We manufacture and distribute over 25,000 different fabrics—many of which are of interest to plastic manufacturers. Our knowledge of fabrics made of cotton and other fibres and their application to industrial processes has enabled us to help solve many a tough production problem.

We represent twenty mills and maintain the finest textile research laboratories. You will find us prepared to work with you toward the selection or development of fabrics most suitable to your needs.

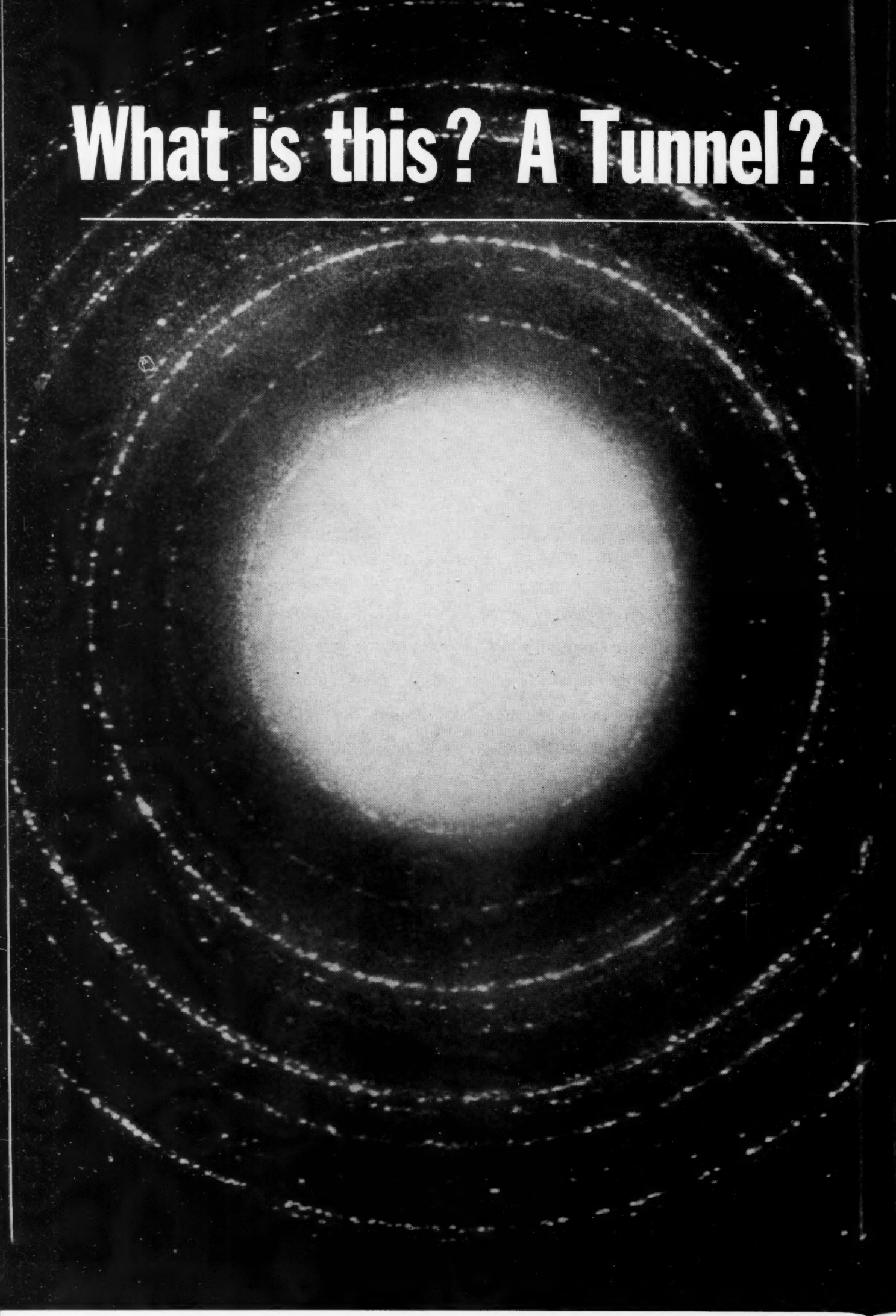
Among the industrial fabrics we distribute are a very wide range of filtration fabrics. Our long experience in this special class of fabrics makes it possible to produce the varied line required to meet the individual needs of processing operations carried out under widely varied conditions.

WELLINGTON SEARS COMPANY

65 Worth Street, New York 13, N. Y.

BUY MORE WAR BONDS

What is this? A Tunnel?



Ask POWELL for the Answer to all your VALVE requirements

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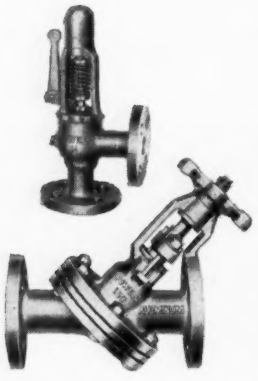
THE WM. POWELL CO.
Dependable Valves Since 1846
CINCINNATI 22, OHIO



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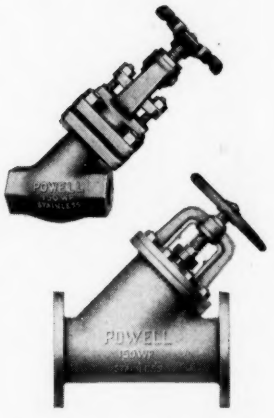

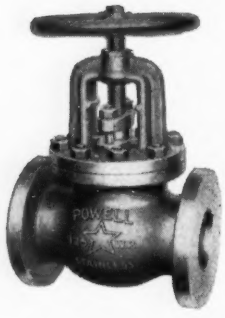

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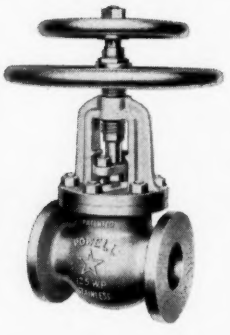

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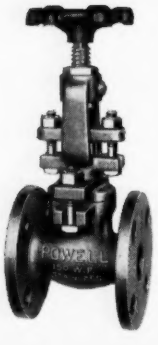

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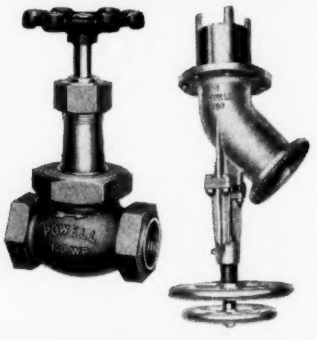

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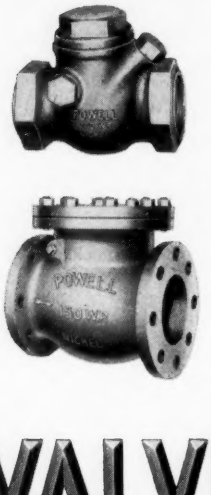
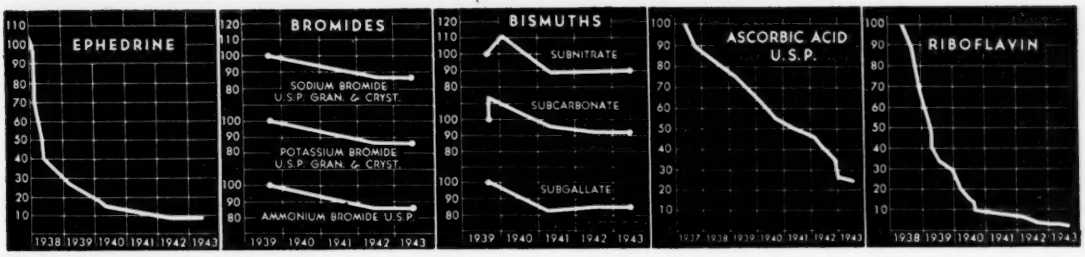


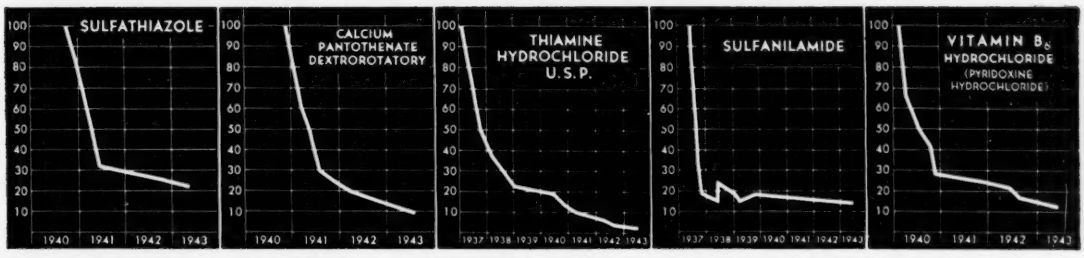
POWELL makes a complete line in pure metals and special alloys for Corrosion Service.
THE WM. POWELL CO.
Dependable Valves Since 1846
CINCINNATI 22, OHIO

A Gold Star, to be added to our Maritime "M" Pennant, has just been awarded us for continued meritorious production performance during the last six months.

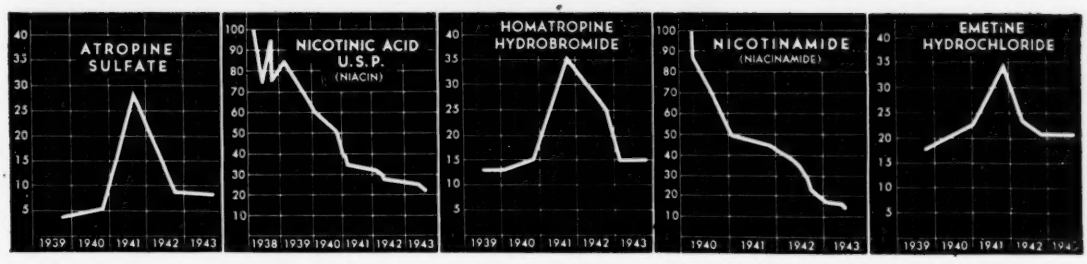
POWELL VALVES



NOT ALL PRICES ARE GOING UP



. . . as these charts clearly show



The points plotted on these charts represent actual prices converted to percentages. In each chart, 100 per cent represents the earliest price in the trend, and all subsequent prices are in exact relationship to it.

At the outbreak of the war in 1939, Merck & Co., Inc. issued a statement to its customers on the importance of price stabilization of essential drugs and chemicals, and announced its intention—

- To discourage forward buying of strategic products, and
- To devote its best efforts to providing Merck Products to customers at normal values, based upon past purchases and the availability of supplies.

Early in 1942, we pointed out that necessary price increases during the preceding fifteen months had been relatively few, and that on many other important products the price levels were even lower than in 1939.

And now, in the Autumn of 1943, we present further evidence that our price policy is sound and equitable, and that it is working in the best interests of our customers.

The charts above show the price trends of Bismuth, Bromides, Ephedrine, and other staple chemicals, as well as some of the newer products—the Vitamins and Sulfonamides. As these charts indicate, normal price levels have been maintained on certain typical products, and consistent *price reductions* have been made on others.

In other words, despite wartime restrictions, shortages of materials, and manpower problems, our policy of supplying Merck Chemicals at normal values remains unchanged.

MERCK & CO., Inc. *Manufacturing Chemists* RAHWAY, N. J.

New York, N. Y. • Philadelphia, Pa. • St. Louis, Mo. • Elkton, Va. • Chicago, Ill. • Los Angeles, Cal.

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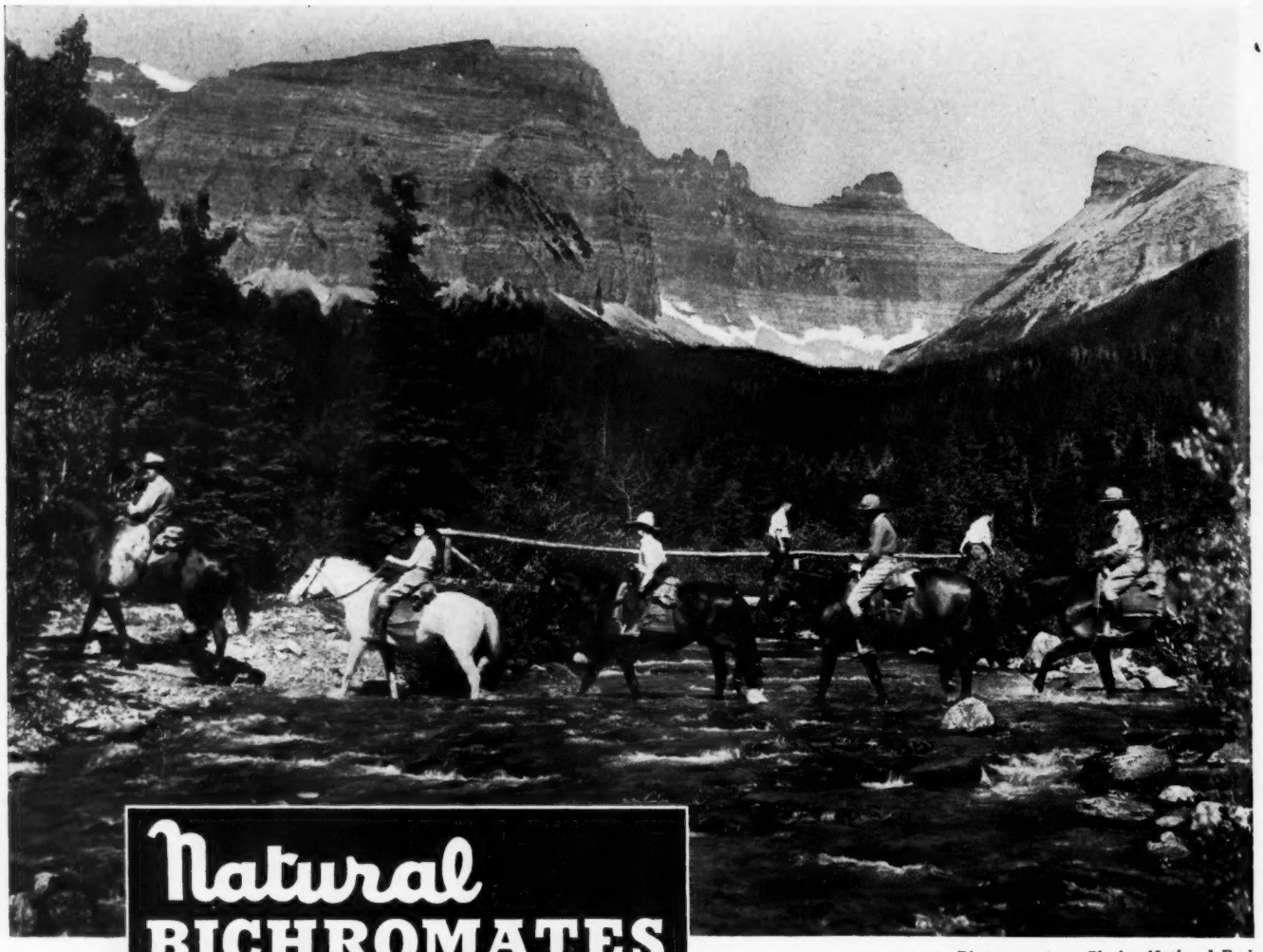


Natural BICHROMATES for Victory and Peace

Photo, courtesy Glacier National Park

BICHROMATE OF SODA
Crystals - Granular

•

BICHROMATE OF POTASH
Crystals - Granular
Precipitated

When the American way of life is again secure and vacationists can enjoy visiting our great *natural* wonders, such as Glacier National Park, a bit of which is here shown, then Natural BICHROMATES will be available to all. Meanwhile, we continue to devote all our output and our energies toward winning this war.

BICHROMATE Natural OF SODA

Natural
PRODUCTS REFINING CO.
904 GARFIELD AVENUE, JERSEY CITY, N. J.

problems and probabilities

Editorial

by ROBERT L. TAYLOR, editor

TWO YEARS AGO and even one year ago, the outlook for the chemical industry was clear and sharply defined. The Japs determined the pattern on December 7, 1941. Efforts were bent in but one direction—production for war. Little else mattered. In effect there was only one customer to worry about, a customer who knew what he wanted and was willing and able to pay for it.

But now, as the industry embarks on its third year of total war, the outlook is clouded with many things. They are not unwelcome clouds, perhaps, because their very presence arises from the fact that the battle is finally going in our favor and victory can be seen in the distance. They do, however, make any attempt at forecast of things to come a rather hazardous undertaking.

IF THE EXPERTS ARE RIGHT, the European phase of the war will end this year. This will cause some change in demands for chemicals. With major military emphasis shifted from the European to the Pacific theater, especially if strategy in the latter continues to be island-hopping, demands for semi-tropical clothing, rubber footwear, anti-malarials, insecticides, waterproofing materials, and the like, will be increased with corresponding increases in the chemicals required in their manufacture. Greater emphasis on amphibious warfare will require shifts in armament and transportation requirements, which will have an effect on consumption of individual chemicals.

Any large scale resumption of civilian goods manufactured this year seems improbable unless the German surrender comes very early, which also seems improbable, although anybody's guess in that matter seems to be acceptable these days. In any event, though not confronted with a serious reconversion problem itself, chemical industry will in many cases have to wait on reconversion of other industries before it can ship material to civilian goods manufacturers. A washing machine manufacturer, for example, must be able to get steel, motors, rubber rollers and several score other items before he can use any plastic knobs or resin enamels. Presumably this coordination will be handled centrally, at first at least, by a government agency such as WPB, but there will still be delay and quite probably periods of inventory accumulation in some chemical lines.

AN ACUTE MANPOWER SHORTAGE will run throughout the whole picture this year. The schedule for production of war materials calls for overall operations at a rate about the same or slightly above that reached in December 1943. Thus step-ups in certain finished war items will absorb manpower released by raw materials and construction curtailments, while induction of men into the armed service will continue apace. Manpower, more than materials, will be the controlling factor in decisions to make raw materials and chemicals available for civilian goods.

Enforcement of the ban on deferment of 18 to 22-year-olds may hurt some chemical operations seriously through loss of young college men. The situation is one of starting the year with a shortage of chemists and chemical engineers and no additions or replacements in sight. Returning veterans may provide some relief toward the end of the year, but as far as the technical men are concerned, most will require a short brush-up period. The manpower draft recommendation of the President is not likely to be acted upon for political reasons, so no help can be looked for from that direction.

CHEMICAL RAW MATERIALS will not be a problem as far as war needs are concerned. Increased producing facilities for some of the inorganics that were shortest in 1943, such as phosphates, soda ash and calcium carbide, will contribute to an easier situation in 1944 although civilian requirements will be far from met in most cases. In general, inorganics will be in an easier position than organics. Provided the industry is not hit too badly from the manpower standpoint, total chemicals production for 1944 should equal and probably exceed 1943 despite effects of cutbacks in some armament lines. This latter will be offset by additional plant capacity that came in late in 1943 and is yet to come in 1944.

POSTWAR PLANNING will continue to receive increased attention from management, with paper plans being developed as far and as detailed as time and available qualified personnel will permit. Promised release by WPB of production, consumption and inventory statistics on chemicals will provide a useful tool for getting down to real quantitative evaluation of postwar competitive conditions. Those fortunate enough to

have technical personnel who can devote time to exploratory and developmental work on new postwar products will find that they will be able to get experimental samples of materials previously restricted.

GOVERNMENT PLANT DISPOSAL POLICY will be clarified as the time approaches when action will be necessary. The influence of a congress which is becoming increasingly friendly toward industry will be felt in the course of this development, as will also Canadian plans and experience which happen to be much further along than our own.

BY WAY OF SUMMARY, it can be said that the outlook for the chemical industry in 1944 is generally good, despite manpower problems and possible slackening in some lines while waiting for vanguard reconversion of consuming industries. The course and rapidity of war developments will be the major influence in almost all phases of the industry's activities. The national elections will probably have little effect. The main job will still be overwhelmingly one of producing for war, and all matters will be governed thereby until both Germany and Japan are defeated.

Technical Student Draft Unsound

THE SENTIMENT OF CHEMICAL INDUSTRY and the engineering profession toward the Selective Service order banning draft deferments for men between the ages of eighteen and twenty-two has been well expressed by Dr. Edwin Sharp Burdell, director of Cooper Union.

Elimination of deferments for engineering and science students in these age brackets would be "a blow both to war production and to the continuity of the development of science and engineering in the United States," Dr. Burdell said.

"If Selective Service is to be truly selective the evaluation of individual contributions to the war effort should be the primary consideration, rather than the age group in which a man happens to belong. Age, within the limits set by the act, marital status and dependency should have nothing to do with the rigorous administration of a Selective Service law.

"The assumption that plenty of experienced engineers are, or will soon become, available through contractions in war industries is begging the question. The delicate balance of war production will be upset dangerously and unjustifiably by removing essential scientific workers.

"The best remedy, however, is not more drastic legislation, but the utilization of the existing orderly processes of selective induction of civilians into the uniformed services. If local boards feel unable to evaluate with complete accuracy the war contribution of engineering sudents, they can resort to panels of high-type engineers who can investigate the cases and make recommendations. Such a reference group is working successfully in the New York metropolitan area."

We believe that Dr. Burdell's recommendations are wise and realistic. The Selective Service blanket order should be rescinded. It will be up to industry and the scientific and technical schools, however, to convince the public and Government of the soundness of this point of view. Here is a case where broad public enlightenment is sorely needed for the benefit of both the war effort and the mental condition of those few young men who would be asked to stay at home in essential war jobs and resist the constant pressure to get into uniform.

Wartime Impact on Packaging

FOR SEVERAL YEARS prior to the outbreak of the war the art of packaging was gradually being recognized as one of the most important phases of merchandising. It had developed into a major concern of top-flight executives who had come to realize its value in selling, and in building and maintaining good will among customers.

As a result of this attitude the art of packaging was rapidly approaching a science, commanding the services of technically trained experts qualified to select and test materials and to design and engineer the structural features of packages so that they provided the fullest measure of product protection, economy and service. In the light of what has happened during the war, it is fortunate that this technical spadework had been done by both manufacturers and users of containers, for the needs of war called imperatively for scientific packaging.

Improved packages in greater quantity had to be turned out at the same time that the old standby packaging raw materials such as tin, steel, aluminum, rubber, burlap, plastics, etc., were either being cut off or allocated in large part to more essential production. All along the packaging line, from small units to large, substitutions have been made as one material or another became critical.

Because of this rapidly shifting picture, there have been numerous changes in I.C.C. Regulations, government specifications, and standardization practices. Many of these revisions were promulgated "for the duration" in order that certain restrictions, which in peacetime were considered necessary and safe, might be modified in wartime.

But will these substitutes be content to die a natural death after the war? We think not, for many of the new materials and techniques have proven highly satisfactory and in some cases definite improvements. Evidence that this is true is the fact that so many of these substitutes have been used without complaint. Neither the producer nor consumer will relinquish advances brought by the spur of necessity.

Packaging possibilities of the future should be looked to with interest and anticipation by the chemical industry both as one of the largest consumers and as a supplier of many products used in the fabrication of containers.

Multiple Management Works in Wartime

by H. WALTER KUHL, Chemist, McCormick and Co., Inc., Baltimore, Md.

HIGH TURNOVER, absenteeism, and draft demands are among the bigger management headaches of most companies engaged in war production. To combat these problems, various methods are being used with varying degrees of success. McCormick and Co., Inc., of Baltimore, which is shouldering a sizeable portion of the war burden in food dehydration and drug and insecticide distribution, is finding what so far has proved to be a very satisfactory solution in the unique management system under which it has operated since 1932. Multiple management as practiced at McCormick, is a system which trains leaders, produces ideas and demonstrates to the employee group that management has a sincere interest in employee welfare.

In one respect in particular, multiple management has been found to provide the right resources to meet a serious adjustment which war changes in personnel have made necessary in almost every business. As in other industries, the services of some of the company executives were lost temporarily, and conversion had to be effected from peacetime to wartime operation with the necessity of establishing new plants in other parts of the country for expanded production. A dearth of responsible executive material threatened the plans of the company, but only momentarily, for largely because of the broad training in all phases of the business and the thorough understanding of company policy gained by so many employees through service on one of the four boards of directors under the multiple management system, these vacancies were filled with a minimum of difficulty and without the strain and upheaval so frequently experienced under similar circumstances elsewhere.

Business is Like a Chemical Reaction

There is a great deal of similarity between operating a business and carrying out a chemical reaction. In both cases, certain raw materials or reagents are required and they must be combined in such a way as to yield a certain desired end product. A business requires a certain physical plant, and a reaction requires a reaction vessel. Each must be designed for the function it is to serve. A business needs labor, and a reaction requires energy input. Yet the raw materials, the physical plant and the labor, would not by themselves yield the desired product. They require intelligent combination. Such combination or direction is the function of management. Capital is needed to supply the raw materials, labor to convert them, and management to direct the conversion. To claim that any of these is more important than another is like trying to decide which is the more important part of a watch, the main spring, the hands, or the balance wheel. For a mechanism or a business to function properly as a whole, cooperation is needed among all parts.

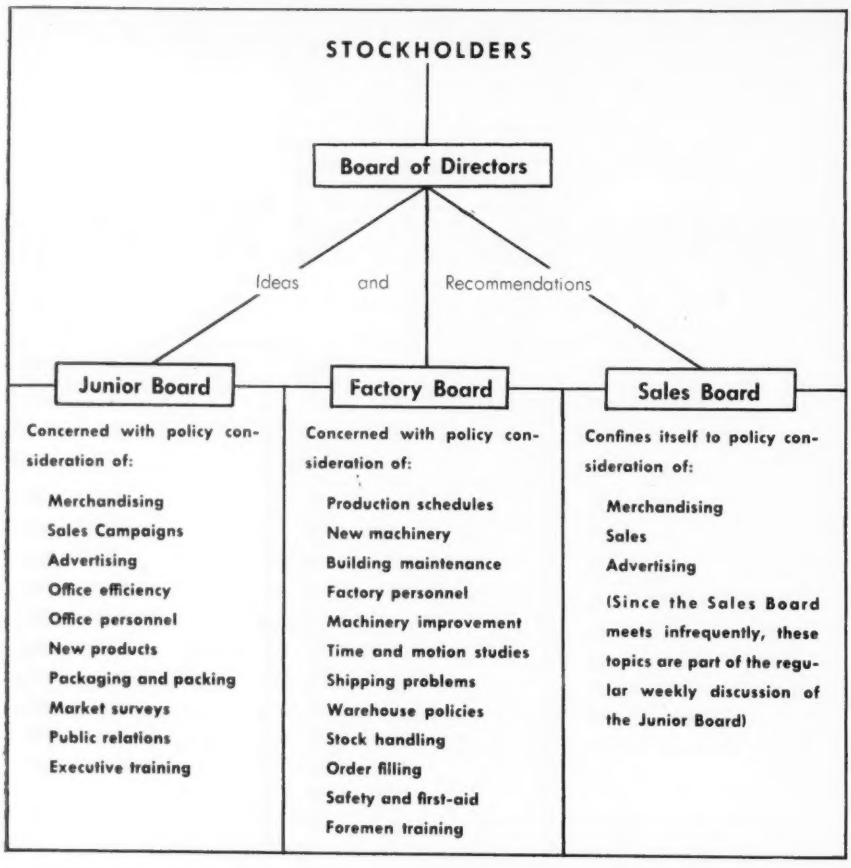
Multiple management is a type of business management originated in 1932 by Charles P. McCormick, president of McCormick and Co. It has succeeded in the operation of that company for over ten years and is now in use with modifications in some 350 firms in the United States and foreign countries.

McCormick and Co. was founded in 1889 by W. M. McCormick, uncle of the present president. From then until his death in 1932, the company was largely a one-man business. During this period, through his ability, it reached the position which it holds today as the largest spice and extract business in the world. C. P. McCormick was elected president in 1932. For 17 years before that he had worked in the factory, as a salesman on the road, in the office, and eventually as vice-president. In that time he came to know the employees and studied their desires and interests. He realized that the type of young men who were destined to be tomorrow's leaders felt that business too often retained control so firmly at the top that they were not given opportunity to prove what they could do or train themselves to do well at the top when their time came. The old one-man boss plan simply failed to take them into account. Thus the idea of multiple management was formulated during this period. By contrast to the old one-man method of management McCormick & Co. today determines its policy on the considered opinions of some 60 key employees, and its growth has proceeded at a pace beyond the founder's fondest dreams.

How the System Evolved

The first step in bringing younger men into management was the establishment of a second board of directors. The existing board was renamed the "Senior Board of Directors" and became the basic policy making body. The new board was named the "Junior Board of Directors."

A CHEMICAL SPECIALTIES CONCERN in Baltimore has made a ten-year test of a unique system of business management. It weathered a depression, moved quickly and efficiently to convert for war production, and now finds resources within itself to meet wartime personnel problems. Multiple management has been tried on practically every count and found not wanting.



Although the whole conception of multiple management is one of voluntary cooperation rather than of rigid division of authority, this chart outlines its main organizational features.

This first Junior Board was selected by management. It then drew up its own by-laws, elected its own chairman and secretary, and set up a procedure for electing new members every six months with the provision that three of the current members be replaced by three new members at each election.

A few months later the multiple nature of this new type of management was emphasized by the establishment of a third board, known as the "Factory Board of Directors." This group was made up of men who were not members of the Senior or Junior Boards, and who were, for the most part, supervisory executives in the plant interested primarily in manufacuring and production problems. The Factory Board organized itself along lines much like the Junior Board, providing for a chairman and secretary and election every six months that would bring new blood into the Board. To gain the management contributions of outside men working and studying field conditions, the Sales Board was established to round out the multiple management system. These four boards, totaling about 60 men, have managed McCormick and Company for the last ten years.

Based on Voluntary Cooperation

The whole concept of multiple management is one of voluntary cooperation rather than rigid division of authority. There is no attempt by the Senior Board to define the limits of the lower board discussions. Any phase of the business may properly come before the boards, and all necessary information to analyze these subjects intelligently is available. There are, however, certain spheres of operation in which each is logically most interested.

The Senior Board functions exactly as would the board of directors in any corporation. The members are elected by the stockholders, for one year terms with no limits on re-election. It is not, however, an absentee board. All members are actively employed by the company, most of the department heads being members.

The Junior Board has now assumed practical responsibility for policy on such matters as:

- Merchandising
- Sales campaigns
- Advertising
- Office efficiency
- Office personnel
- New Products
- Packaging and packing
- Market surveys
- Public relations
- Executive training

The Factory Board advances and considers ideas on such matters as:

- Production schedules
- New Machinery
- Building maintenance
- Factory personnel
- Machinery improvement
- Time and motion studies
- Shipping problems
- Warehouse policies
- Stock handling
- Order filling
- Safety and first-aid
- Foreman training

The Sales Board confines itself to merchandising, sales and advertising matters. Because the Sales Board meets infrequently, these topics often come up at the Junior Board meetings.

The three lower boards function principally as idea "feeders" to the Senior Board. All recommendations must have the unanimous approval of the Junior or Factory Board before being passed on to the Senior Board for action. It might be questioned whether this procedure is speedy enough for the decisions necessary in war production; but while the Junior, Factory and Sales Boards suggest and recommend measures to the Senior Board, the Senior Board does not require unanimous, majority or any kind of approval from the other boards, and action is not delayed. The requirement of unanimous approval causes ideas to be so thoroughly discussed before being enacted as recommendations, that the record of acceptances by the Senior Board is rather amazing. A study of Junior Board minutes over a five-year period reveals that of the 2,109 definite recommendations which were passed and submitted to the company for action, only 6 were turned down. Therefore, 2,103 fresh new ideas have found their way into company operations, a greater number of ideas put into effect than the Board of Directors of the company under the old system had enacted in its entire lifetime of 43 years.

Does Not Usurp Executive Authority

It is not the purpose of multiple management to cut across departmental lines and assume supervisory authority. The boards are looked upon as discussion groups, supplemental idea groups, and training schools for executives—not as deciding factors on every routine decision. Departmental heads and supervisors have the same functions and the same kind of responsibility to plan and act for the good of the business as those of any other company—and to act with the same efficiency. But the boards help them by encouraging ideas, reviewing and discussing plans, and training men under top management in the things they need to know to fill vacancies at heads of departments as they occur. The boards, in fact, are not constituted so as to represent departments. Actually the representation is very broad, and the type of election is such that the members are elected as individuals, without regard to department or position in department. Naturally the boards tend to keep a type separation of their own accord. A shop foreman is more likely to become a member of the Factory Board and a purchasing agent a member of the Junior Board, than the other way around. There are, however, many cases of men now on one board who have previously served on one of the other Boards.

The method of election may be illus-

trated by the Junior Board, which now consists of ten members and seven associates. At the time of the next election, each of these seventeen will rate the sixteen others on the basis of certain characteristics — initiative, imagination, judgment, leadership, etc. The ballots are turned in to a committee of the Senior Board which tabulates them. The six men receiving the highest ratings become regular members of the next term. These six then meet and elect four more to make up the ten regular members. The ten regular members then elect the associates. To encourage competition, at least three are dropped and three new men are added. Thus while the Board re-elects its own members it cannot perpetuate itself as a whole. The election of the four other regular members and the associates is not limited to past members. It would be possible to have only the first six as carry-overs and the whole rest of the Board new. The ten regulars pick the associates for the next three months.

Practical Employee Relations

As a means of solving the basic question of employer-employee relations, multiple management has done rather well. One of the secrets that has been found to be most effective in bridging this gap has been the policy of keeping employees informed. A well-managed company has other means of communicating to its employees than a company bulletin board. One of the first rules in keeping employees informed is to be on speaking terms with them. The second principle is that of having a regular plan or method to keep employees informed of the status of company operations so that they are not faced with a sudden piece of information that is startling and unsettling. Where employees are a part of management and a part of the business democracy, there is no question about being on speaking terms with them. The broad representation of members of management throughout all the departments makes passing on of information a simple and natural procedure. For approximately 10% of the McCormick & Co. personnel, the members of the management boards, the extent to which they may be taken into confidence on business matters is practically 100 per cent. Some information is withheld as a matter of policy, such as detailed financial data, details of stock distribution, and detailed product formulas. But being informed of the general overall operations of the company injects a new spirit of sharing a responsibility and a spontaneous desire to cooperate in the very men who, under any other system, would be on the outside looking in without any great knowledge, interest, or sense of pride in the welfare of the company as a whole because their work would be limited to departmental operations.

The multiple management idea extends down to every employee in that no gulf exists between management and employees. It is a system that gives full rein to the human equation in business practice with its basic premise that the more people who can be efficiently brought into active management participation, the greater will be the employees' knowledge and interest in company affairs. It has demonstrated the wisdom and practicality of this philosophy by having avoided the labor strife that has harassed other systems of management and widened the rift between management and labor rather than bringing about the cooperation and goodwill which are the essential catalysts to efficient production.

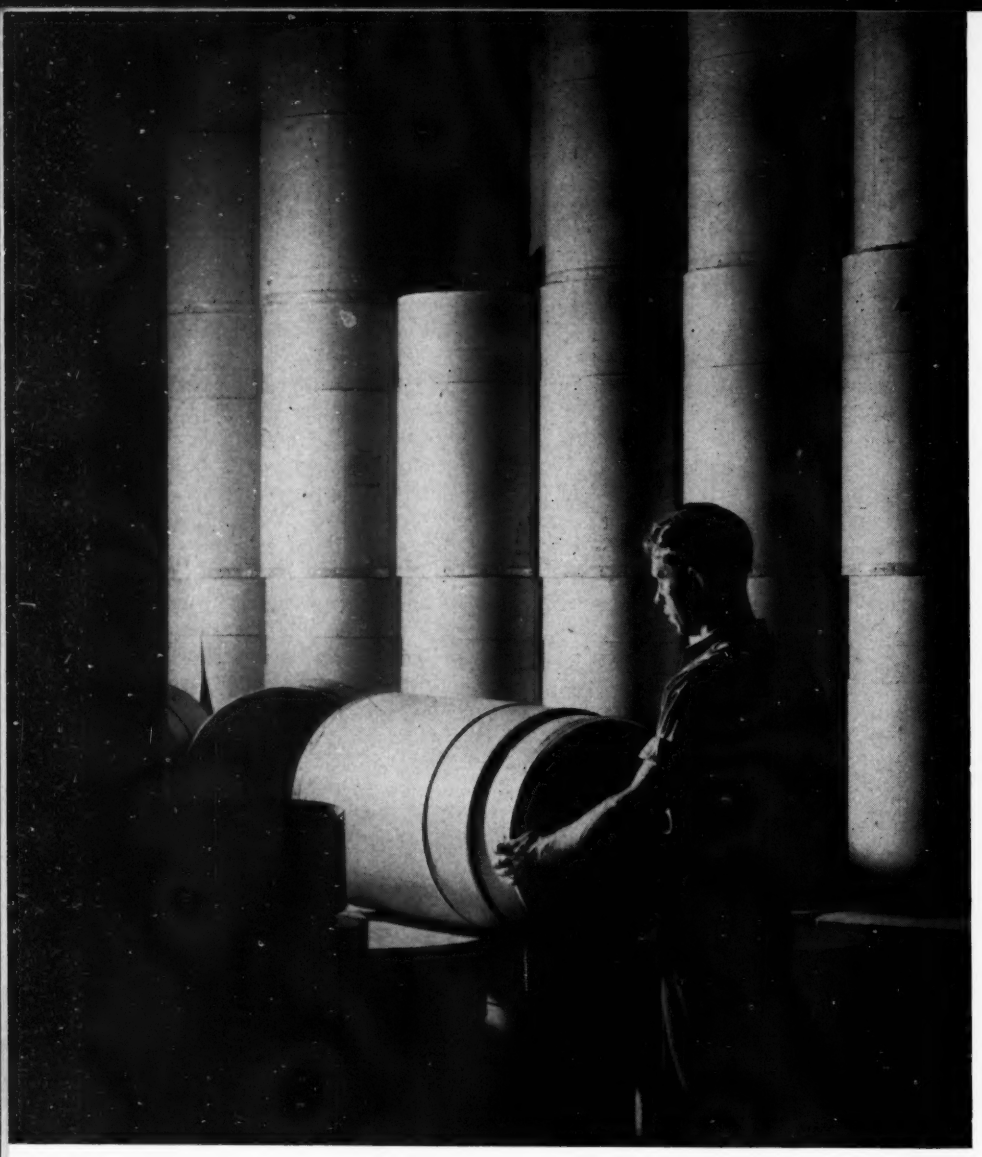
The company is not unionized. A labor organization once paid this tribute to the company president, "You know, Mr. McCormick, we came down to organize your plant one day, but we found out, after we looked into it, that your company was doing the things for its employees already that we, as a union, would want to do for them."

In all the major factors which are considered the modern touchstones of success in business, multiple management has an unusual record. There is a pride of possession on the part of everyone who works for McCormick—a feeling of belonging—a desire to think in terms of the company and the group as a whole rather than in selfish individualistic thinking. Secondly, there is the exceptional advantage in training. The war has taught how valuable it is to have a management system which trains for prospective leadership. Salesmen have transferred easily to the purchasing department, advertising executives to expediting government contracts, and when the head of the spice department was called to Washington to head the Food Distribution Administration Spice Section, a young man from the purchasing section took over the spice desk.. Third, it has proved to be a discoverer of talent. Bookkeepers, stock clerks, and shipping clerks, who had little opportunity to display management ability in their regular jobs, have proved, through their ability as board members, to be capable managers and have been advanced to supervisory capacities or even transferred to sales departments when their abilities proved to be in that direction. Finally, multiple management is the finest idea producer a company could have.

Has Helped Profits

Under ten years of multiple management, McCormick and Co. has made more money each year than the preceding year and has seen its profits passed back to the employees in the form of profit-sharing bonuses. It has seen its young men of the Junior and Factory Boards move on to membership on the Senior Board until now the thirteen men comprising the membership of the Senior Board include eight who are former Junior Board members. It has a record of nine years peace time average turnover in employees of only 3%. Even now, at the height of the war rush, absenteeism is being kept to a minimum 4%. Last August the company received the Army-Navy "E," symbol of a high war production record. Achieving it as it has without sacrifice of any of the gains in employee welfare and good relations, the multiple management system of McCormick and Co. constitutes a strong case for the democratic method in business management for today and the future.

Gathered to receive their Army-Navy "E" award, McCormick employees give the victory sign.



Suggestions for Conservation of Fibre and Paper Containers

by T. PAT CALLAHAN
Supervisor of Containers, Monsanto Chemical Co.

THE NEXT SIX MONTHS will be critical ones as far as meeting military and civilian requirements for pulp and paper is concerned. All industries are being asked to participate in the national drive to conserve paper. Here are some ways in which the chemical industry can help and at the same time assure itself of enough paper and fibre containers to ship its products.

THE chemical industry has a big stake in the current nation-wide campaign to conserve and salvage paper. A large number of dry chemicals, of both a dangerous and non-dangerous nature, are shipped in paper and fibre containers whose supply is threatened by the present critical shortage of wood pulp.

The three most common paper packages used by the chemical industry are the solid fibre drum, the solid and corrugated fibre box and the multiwall paper bag. Re-use of these containers wherever possible is the best method of keeping an adequate supply of them for all chemical manufacturers.

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PAPER IS CRITICAL

DON'T WASTE IT

★ ★ ★ ★ ★ ★ ★ ★

A prime prerequisite to the re-use of any paper container is careful handling. The fibre drum, for instance, with the changes which have been made in its construction, can be shipped cross-country as many as three to five times if properly handled. Corrugated and solid fibre boxes can be knocked down and packed in bundles for return to the supplier.

In this country, chemical industry has not been called upon to re-use multiwall paper bags to the extent that it has in England where critical shortages have made it necessary to re-use such containers even to the extent of removing the outer wall, and sometimes two outer walls.

Large users of multiwall paper bags can effect savings of paper by emptying the bags carefully and selling them to a local dealer for re-use, thereby saving on the purchase of new bags. Large producers of chemicals cannot re-use multiwall paper bags because operations are so engineered that it is impossible to fill automatically any container other than a new bag. However, there are other operations which can re-use these bags and the industry will do well to consider all such conservation measures since it appears from the present outlook that the critical shortage of pulp will cause a further curtailment of containers, and only by careful saving and re-use can a serious shortage of new bags be averted.

A short while ago, the War Production Board launched a voluntary program for the increased re-use of critical shipping containers. Meetings were held in principal cities throughout the country at which the WPB emphasized the need for conservation of critical materials used in shipping goods, and suggested the following ways in which savings might be made:

1. *For Set-Up Paper Boxes.* Carefully collapse bodies and covers by cutting or tearing the four corner stays. Pack flat in used corrugated containers. Corners can be re-taped and the boxes used again.

2. *For Corrugated and Solid Fibre Containers.* If sealed, break seal of flaps by sliding a wooden paddle back and forth (not up and down) underneath the flaps. If gum taped, cut tape, collapse box, tie in bundles. Keep containers free from moisture, dirt, rips and tears.

3. *For Paper and Textile Bags.* Never slash or cut tops off sewn bags—pull chain stitch at proper end. Lift bags, don't drag them on the floor.

4. *Instruction in Handling of Containers* should be given all shipping and receiving clerks. Each container should bear a sticker outlining briefly the requirements for proper care.

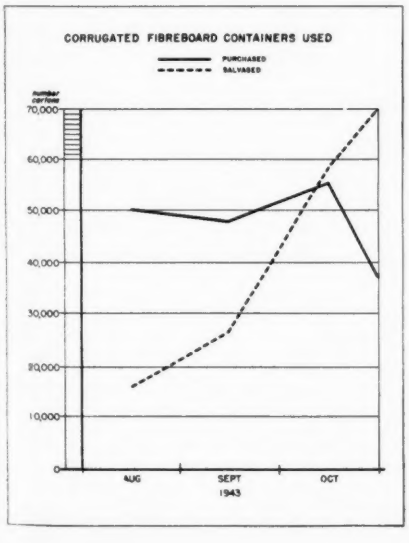
5. *If Containers Cannot Be Returned to Original Shipper,* conservation can be practiced by the recipient re-using them himself. Any paper containers not suitable for re-use by recipient should be sold at once to a re-used container dealer or directly to another user. Containers too battered for further use should be sold for salvage to a waste paper dealer.

Shippers have been asked to send the WPB Container Division a brief outline of useful experience gained from container re-use. This information can be made available to other shippers with related problems. The success of WPB's container re-use program hinges upon full, voluntary effort and cooperation on the part of each industry with wartime container problems.

The chemical industries have done a remarkable job in the re-use of other forms of containers, those of steel and wood. The same careful attention and effort expended on the problem of the pulp and paper shortage will solve it equally well.

Container Conservation Urged by W. P. B.

TO REVIEW PROGRESS made in the Container Re-Use Program, industry representatives met with officials of WPB's Container Division and regional office representatives this month in Philadelphia, Cleveland, Detroit, Minneapolis, and Kansas City. One outstanding case record was presented where over a three-month period a mail order house was able to increase its monthly use of salvaged corrugated fiber containers from 20,000 units to 70,000 units and at the same time cut its use of new containers from 50,000 to 40,000. The course of this unusual record is shown on the accompanying chart.



Manufacturers and users of fibre shipping containers are being urged by WPB to check their inventories for obsolete unused containers and to arrange for their disposal. Many manufacturers are said to have done this already and have been quite successful in getting these idle inventories into circulation. Two companies reported locating and disposing of 750,000 fibre containers each. The importance of putting every container into service cannot be overemphasized in this period of critical shortage.

Trends in Industrial Research

by MAURICE HOLLAND, Research Advisor, New York City

MR. HOLLAND, WHO FOR MANY YEARS was director of the Division of Engineering and Industrial Research of the National Research Council, recently made a survey among fifty research executives of large and small corporations to find out what they were thinking, doing and planning to do. The following is a summary of his findings.

INCREASED government interest in scientific research through proposed controls, almost universal acceptance of research by industry, and the rapid growth of research foundations, are foremost among research trends today as indicated by a survey recently made by the writer among fifty industrial research executives. Other indicated research trends in the industrial field are:

1. Some emphasis on postwar planning, aimed at developing new products and new uses for old ones.

2. More extensive co-ordination of wartime research activities.

3. Increased development of synthetic products to replace natural products.

The survey shows that while industrial research continues to dedicate major effort to winning the war, emergency tasks such as seeking substitutes are being brought to completion. As a result, research staffs are having more time for considering programs for long range activities for a peacetime economy.

On the national front, Senator Kilgore's bills for the establishment of an office of Scientific and Technical Mobilization, with a starting appropriation of two hundred million dollars, was by far the most controversial event in the industrial scientific field in 1943. Its significance is that it is considered by some as one of the first attempts on the part of government to control the scientific and technological resources of the nation, including patents, personnel and research projects.

Postwar planning is getting increased attention. Apparently new products utilizing the discoveries of war research are being developed in some instances. Plans for rebuilding research staffs and for housing and equipping them for increased after-the-war activities are taking form in the report and blueprint stages.

One especially significant development is the rise of cooperative industry-sponsored research. This trend is continuing and expanding, with plans for more than half a dozen new industry-sponsored research foundations under way. An illustration of this type of organization is the Institute of Gas Technology located at the Armour Research Foundation in Chicago and sponsored by a representative group of companies in the gas utility and appliance industry.

Also, for the first time, an organized effort is being made to bridge the gap between university and industrial research. This is being done through the establishment of the Engineering College Research Association, whose purpose is:

(a) To cooperate with the war agencies of the Government in the prosecution and promotion of research needed for the war effort, and to assist in organizing the research facilities of engineering colleges to this end.

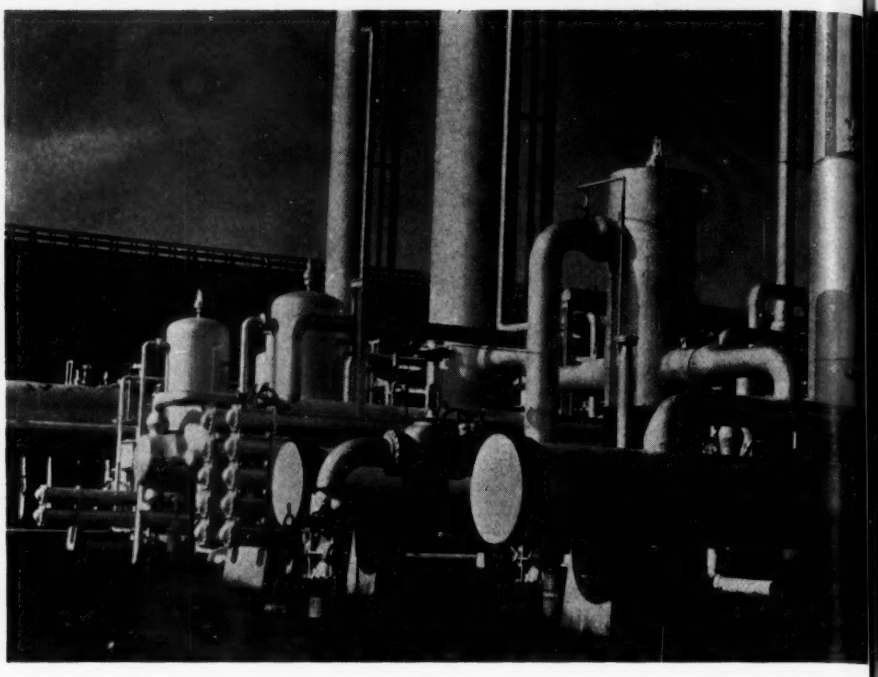
(b) To assist in organizing the research facilities of the engineering colleges in the undertaking of research designed to promote postwar reconstruction and economy adjustment through new and improved processes affecting industry, public works, the conservation and development of national resources, the public health, and similar activities.

(c) To serve as a continuing agency for developing and coordinating industrial and scientific research and for furthering advanced study in the colleges of engineering of the United States.

(d) To collaborate with other associations and with government agencies concerned with research in the interest of the maximum utilization and development of the engineering and scientific research facilities of the nation, to achieve coordination and prevent duplication of effort.

Altogether, the survey indicates a continued heightening of research activity.

Lagged shell and tube heat exchanger installation in gasoline refinery.



PLANT OPERATION

4 Ways to Longer Service from Heat Exchangers

by PHILIP S. OTTEN, The Griscom-Russell Co., New York, N. Y.

DESPITE the large number of heat exchangers now in service, there is relatively little information available on proper maintenance of this type of apparatus. It is the purpose of this article to present a few recommendations for the installation and care of heat exchangers which, if followed, will materially lengthen effective service life.

Reduced to fundamentals, successful solution of the problem of obtaining best performance and longest life from heat transfer equipment rests on fulfillment of the following four requirements:

1. Correct thermal and physical design.
2. Proper installation.
3. Operation in accordance with design conditions.
4. Proper maintenance.

Failures of heat transfer equipment, aside from those attributable to carelessness, are usually directly traceable to non-fulfillment of one or more of these conditions.

The problem of correct thermal and physical design is outside of the scope of this article and should be dealt with as a separate matter. The other three conditions are largely in the hands of the user and therefore can be studied together.

Heat transfer apparatus cannot be properly operated or maintained unless it has been correctly installed. Unfortunately few manufacturers of this type of equipment give proper installation instructions.

The first consideration in installing a heat exchanger is of course location. Units should always be placed so as to permit access to all parts for cleaning. In removable tube bundle types, room must be provided for removal of the shell cover and floating head as well as the entire tube bundle. A space of three or four feet at the floating head end is generally sufficient to remove the shell cover and floating head. The manufacturer should be consulted for directions for removal of the tube bundle, but usually a space at the channel end equal to the length of the unit is sufficient.

Foundations should be designed to prevent settling and undue piping strain. All supports should not be rigidly bolted to the foundation. The usual method is to use slotted bolt holes in the supports at one end of the exchanger (preferably the opposite end from piping connections) and loosened bolts to allow expansion movement. Units should of course be set level and square; otherwise piping connections will have to be forced into position and leaks will occur when additional strains are imposed under operating conditions.

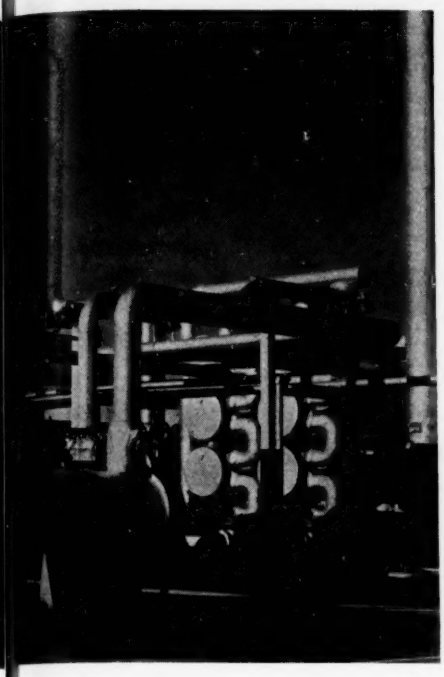
For heavy tube bundles a means should be provided to carry the weight of the bundle as it is removed from the shell. Since the bundles must be removed in a straight and level line to prevent damage to tubes and baffles, a track and cradle is frequently used. Light and short bundles may be successfully handled by cranes with the use of eye bolts fastened to the tube sheets.

Before connecting the piping, be sure to check all of the openings in the exchanger for foreign material, but do not leave the openings exposed to the weather since moisture in the unit will cause rusting, and in cold weather severe damage can be done by freezing. Be sure the piping system is clean before assembly in order to prevent sand or other refuse from plugging or otherwise damaging the exchanger. Strainers or settling tanks are recommended in pipe lines leading to exchangers.

If the apparatus is to be connected with reciprocating pumps, surge drums are recommended to smooth out fluid pulsation. Pulsation of fluids has caused tubes to be cut through by cross baffles.

The following accessories should be provided in any heat exchanger installation:

1. A by-pass system to permit removal of unit from service without stopping the fluid flow.
2. Pressure gauge connections and thermometer wells in piping near the unit.
3. Air vents and air vent cocks to forestall gas or vapor binding of transfer surface.
4. Drains and drain piping. It is recommended that drains should not be piped to common closed manifolds.
5. In apparatus such as evaporators



and condensers, in which there are gas or vapor spaces, gauge glasses should be provided to show liquid level.

Before connecting piping and admitting fluids to the apparatus, the working temperatures and pressures as indicated on the name plate should be noted. Also, the direction of flow shown on the manufacturer's drawing should be checked with the piping hook-up.

It is not the general practice of heat transfer manufacturers to furnish operating instructions with the apparatus, so the following rules will be helpful. They apply to the majority of such apparatus.

1. In starting operation, open vent connections and start circulation of the fluid whose temperature most closely approximates temperature of exchanger at starting time.

2. Do not close vents until all passages are completely filled with fluid. Large percentages of surface can become ineffective as a result of air or vapor binding.

3. Do not shock unit with sudden admission of extremely hot or cold fluids. Repeated opening and closing of valves by automatic temperature control apparatus sets up repeated stress and strain and will cause metal fatigue. It is advisable to consult manufacturer of heat exchanger regarding proper design before putting in such an installation.

4. Never shock heat exchanger thermally or physically if it can be avoided. If intermittent operation is necessary, make sure manufacturer has been advised and that this has been taken into account in the design.

5. Do not operate equipment in excess of operating conditions given on name plate. If equipment is to be used for a purpose other than that for which it was designed, it is advisable to check with manufacturer.

6. Generally the flow of the hot medium should be cut off first in shutting equipment down. If cold medium circulation is to be stopped or by-passed, hot medium should also be by-passed. Try to prevent thermal stress on any unit even though unit has been designed to accommodate this stress.

7. All fluids should be drained from apparatus when shutting down to prevent corrosion, freezing and sludging. In steam heaters, condensate should be completely removed in starting up and shutting down to prevent water hammer.

8. As soon as apparatus is functioning and has reached operating temperatures, all gaskets and joints should be checked and tightened if necessary, to prevent leaks, blowing out gaskets, and scoring of surfaces in metal to metal joints.

9. Provide for periodic checks of temperatures and pressures of fluids entering and leaving apparatus. These usually provide the first indications of trouble.

10. Provide for periodic inspection and cleaning of entire exchanger. This inspection should require removal of tube bundle and visual examination for wear at points of contact between tubes and support plates or baffles. Inspection should be made more frequently if any of the following conditions occur in the normal use of the equipment:

A. Handling of corrosive fluids.
B. High velocity of fluids.
C. Pulsation of fluids, even with surge drum.
D. Handling of fouling fluids.

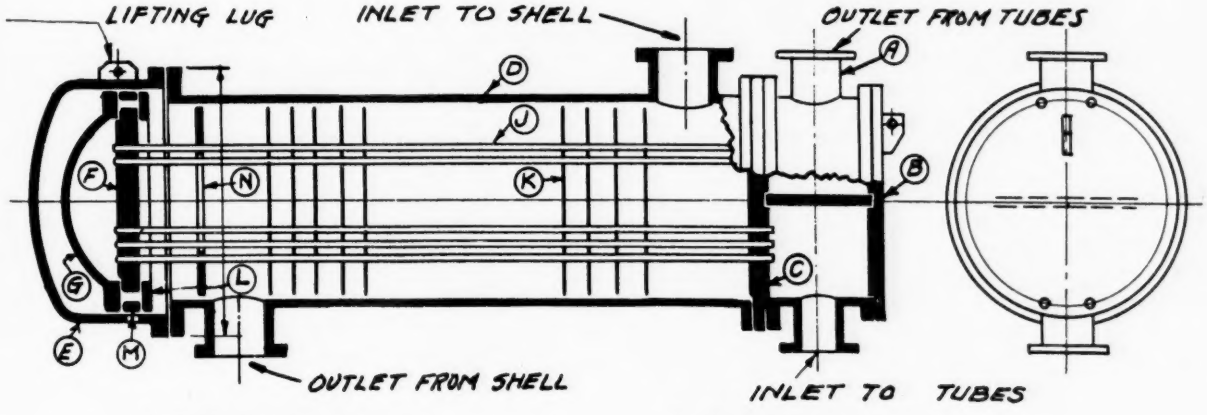
Maintenance

If successive pressure and temperature readings should show an increase in pressure drop or decrease in temperature range, the unit should be shut down for inspection, as these are usually signs of fouling or dirt in the unit. If only a drop in temperature is observed, the trouble is probably vapor or gas binding and should be taken care of at the first safe opportunity.

The following methods may be used to clean heat exchangers:

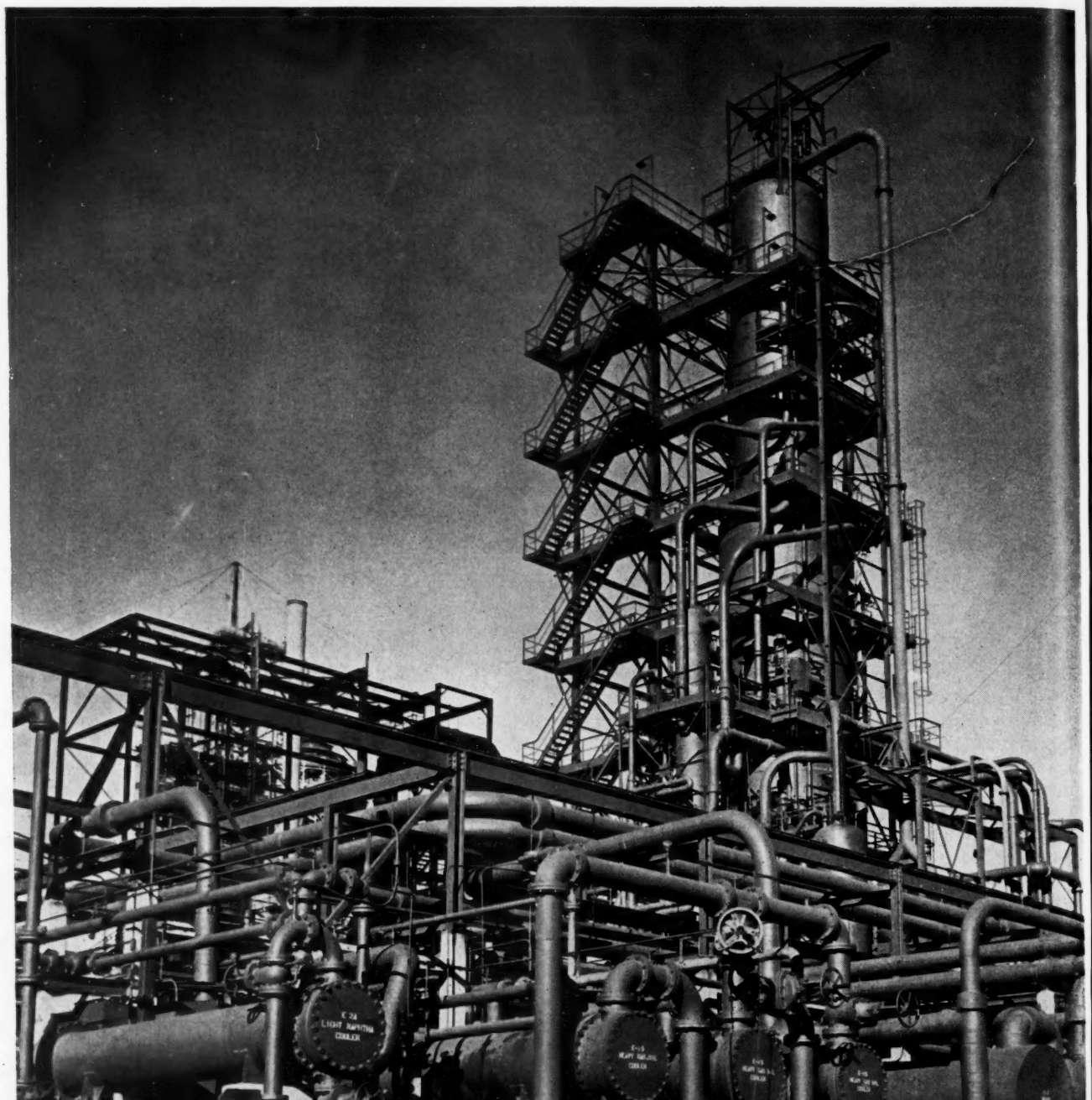
1. Circulate warm fresh water through

Sectional drawing of shell and tube single-pass heat exchanger.



A—Stationary head or channel
B—Stationary head cover
C—Stationary head tube sheet
D—Shell
E—Shell cover
F—Floating head tube sheet
G—Floating head cover
J—Tubes
K—Baffles
L—Floating head split ring
M—Floating head spacer ring
N—Floating end support plate

Single pass shell, two pass tubes, heat exchanger.



Standard Oil of N. J.

Shell and tube heat exchangers in conjunction with crude oil pipe still.

shell and tubes to remove soluble deposits.

2. Circulate hot wash oils or solvents at good velocity through either side to remove soft deposits.

3. Circulate cleaning compounds if the above methods are ineffective. There are compounds now on the market that will remove sludges and cokes.

4. If none of the above methods is effective, a cleaning tool should be used. Depending on type of fouling, brush or scraper bar may be used. Frequent cleaning under bad fouling conditions is advisable because a few of the exchanger tubes may plug completely with consequent overheating or subcooling with respect to surrounding tubes, which results in thermal strains and generally causes leakage at tube joints.

Longitudinally finned tubes may be cleaned on the outside by scrapers.

Below are some rules which should be carefully observed in cleaning and handling heat transfer apparatus:

1. Do not blow steam through individual tubes. This causes over-heating of tubes and results in leakage at tube joints caused by expansion strains.

2. Do not blow air through exchangers handling inflammable fluids.

3. Do not open equipment until all pressure is off and unit has been drained.

4. Do not mishandle tube bundles with hooks or other devices which might damage tubes or baffles. Tube bundles should be moved in cradles or on skids.

5. Do not tighten bolting until gaskets are seated properly.

6. Do not use sharp scrapers which might damage tubes, nor should tubes be hammered on with a metal tool.

To clean and inspect the inside of tubes, remove the channel covers. If covers are not provided, it is necessary to remove the entire channel. With the floating head design, it is also necessary to remove the shell cover and floating head cover.

To locate leaks in tube joints, remove

the channel covers and in the case of fixed tube sheet designs apply fluid pressure to the shell side of the exchanger. If the unit is of the floating head design, remove the channel cover, shell cover and floating head cover. Bolt the test ring in place with gaskets and packing and apply pressure to the shell.

Pressure should be applied only with cold liquids since hot liquids will damage the unit by causing thermal strains.

Obtain Reference Drawing

Because of the many and varied designs of heat exchangers in use today, it is impossible to give anywhere near complete maintenance instructions in a single article of this type. In all cases, reference drawings should be obtained from the manufacturer showing the general construction of the apparatus and how the test ring is applied. Test rings are not usually furnished with the apparatus and must be ordered separately. They are not required in many designs, such as the U-tube, fixed tube sheet and outside packed gland floating head types.

In cases where an integral stationary channel and channel cover have been furnished, it is necessary after removing the channel to rebolt the tube sheet to the shell before applying the pressure test.

A partial check of the tube joints may be conducted by opening only the stationary head end. If no leaks are visible around the tubes at the stationary end but fluid flows in small quantities from the lower tubes of any pass, then there are leaks in the floating end tube joints.

To tighten a leaking tube joint a suitable type roller expander should be used on exchangers using an expanded type of tube point. Some exchangers use welded or cone-seated tube joints, particularly units of the finned type. The cone-seated joints are provided with nuts and can be tightened with a wrench.

Caution must be taken not to over-roll tubes, as this needlessly thins the tubes and may result in rapid failure of the joint under the stresses of operating conditions. For the same reasons, tubes that are not leaking should not be rolled.

Tube bundles should be removed from the apparatus carefully to avoid damage to tubes and baffles. Tube bundles frequently are quite heavy, and since the tubes are of relatively thin metal, the weight of the bundle should never be permitted to rest on only a few tubes. Tube sheets and support plates are designed to carry the weight of the bundle and should be utilized. If this is not practical, then wood blocks should be made to fit the periphery of the bundle. It is desirable to have a skid platform or tracks available to receive the bundle as it is withdrawn.

To pull the tube bundle the following method is suggested. Steel cables or rods should be passed through two or more tubes and through a steel bearing plate on the floating end of the bundle. It is recommended that a soft wood filler block be placed under the steel bearing plate to prevent damage to the tube ends. If rods are used, they should be threaded and nuts provided to fasten them to the steel bearing plate. Cables are threaded through one tube and returned through another. Loops can be formed in the ends of the cable with thimbles and wire rope clips. In some cases it is advantageous to have a steel eye bolt which may be screwed into either tube sheet and thus serve for both lifting and pulling.

Before removing the tube bundle, the manufacturer's reference drawing should be consulted because some designs have longitudinal baffles to make two or more passes of the fluid in the shell. Some of these longitudinal baffles have special devices which in effect lock them to the shell to prevent by-passing of the fluid between baffle and shell. There are cases on record in which units have been irreparably damaged because this baffle lock was not loosened. Instructions about freeing this type of baffle should be obtained from the manufacturer.

If the unit has been in service for a long time without being cleaned or having the bundle removed, dirt may offer considerable resistance to the withdrawal of the bundle. In such cases a hydraulic jack may be used to start the bundle. The jack should not be allowed to bear directly against the floating tube sheet, but rather, a fairly large bearing plate should be used backed by a wood filler.

Tube bundles may be lifted in a vertical position by means of eyebolts in the tube sheets. To lift the tube bundles horizontally (and the following is very important for long tube bundles), it is recommended that slings be made by bending metal plates into a U shape and welding lifting lugs to the ends of the plates. Tube bundles should be supported every ten feet to prevent bending.

If tube bundles are to be moved, lifting is recommended since baffles can be easily damaged by dragging over rough surfaces. Baffles are made of relatively thin material, and must fit closely to the shell in order to assure proper functioning of unit. Damaged baffles allow fluids to by-pass heat transfer surface.

When replacing a tube bundle be sure the gaskets are properly seated before tightening the bolts.

USE LESS··SO OUR FIGHTING FORCES WILL HAVE MORE!

Replacement of Leaky Tubes

There are many acceptable methods in common use to replace leaky tubes. The most generally used are collapsing and drilling, or a combination of the two. In most exchangers the tubes are allowed to extend beyond the tube sheet so that a tool may be forced between the tube and the tube sheet at several points around the circumference of the tube, thus collapsing the tube end. This is done at both ends and the tube is driven out.

The second method consists of drilling the tube end out at each end and then driving the tube out. Care must be taken in drilling to prevent enlarging or oblonging the tube hole.

Care should be taken to prevent a split tube from scoring the tube sheet hole as it is driven out. If a tube is too badly split to be driven out, both holes in the tube should be plugged.

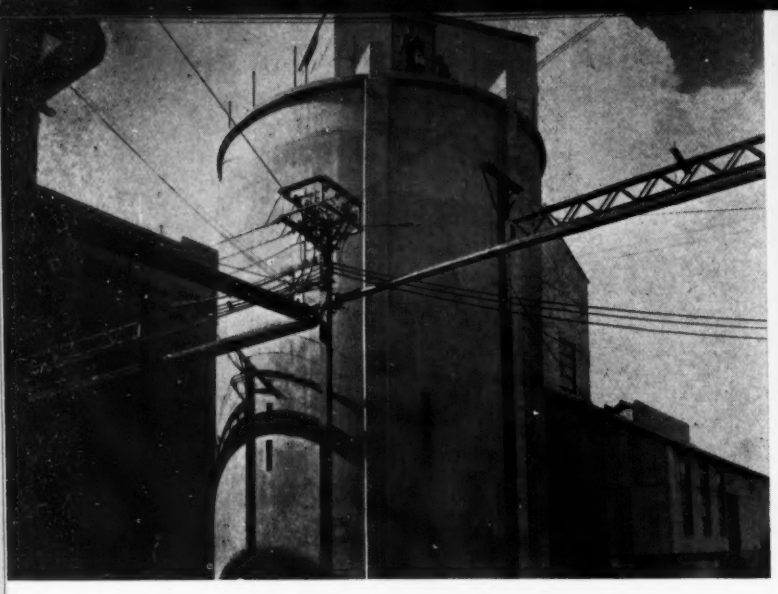
Special tools have been designed for tube removal and the manufacturer of the apparatus should be consulted before attempting to do this type of work.

New tubes are inserted and roller expanded by means of a suitable tool.

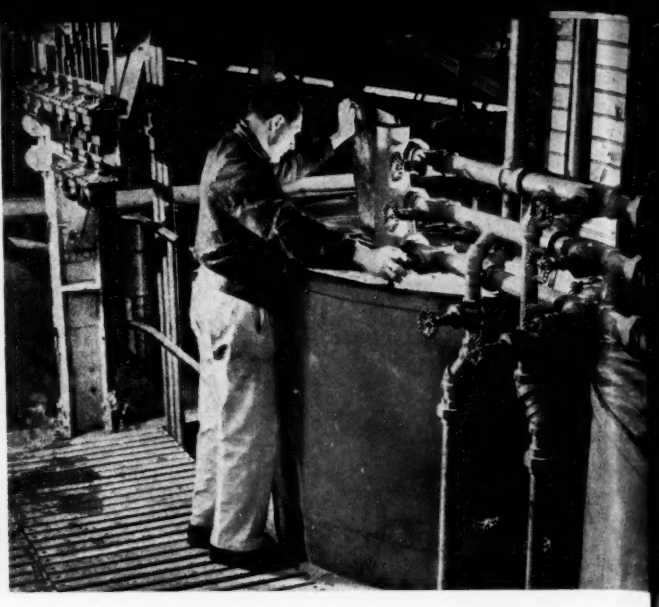
When closing or opening heat transfer apparatus, no wrench or combination of wrench and lever longer than the lengths specified below should be used, as these lengths provide proper leverage. Too much torsion may seriously damage bolting or exchanger threading.

Bolt size	*Wrench length*
½" dia.	12"
⅝" dia.	16"
¾" dia.	18"
⅞" dia.	22"
1" dia.	24"
1⅛" dia.	26"
1¼" dia.	30"
1⅜" dia.	32"
1½" dia.	36"

Proper maintenance of heat transfer equipment is not difficult, and it will pay for itself many times over in the form of more efficient operation and longer service life. The recommendations outlined in this article apply to most exchangers. However, if there should be any question as to their application in the case of a specific installation, the manufacturer of the unit should be contacted for instructions.



Exterior view shows the giant size of the spray dryer. The liquid resin enters as a fine spray at the top.



A plant operator inspects the resin condensate in the supply kettle before it goes to the spray dryer.

Spray Drying Speeds Resin Production

THE production of powdered resins of the water-soluble type, such as those used in plywood adhesives, wet-strength improvement of paper, and weather-proofing of laminated fibre and corrugated board, etc., has grown by leaps and bounds during the past few years.

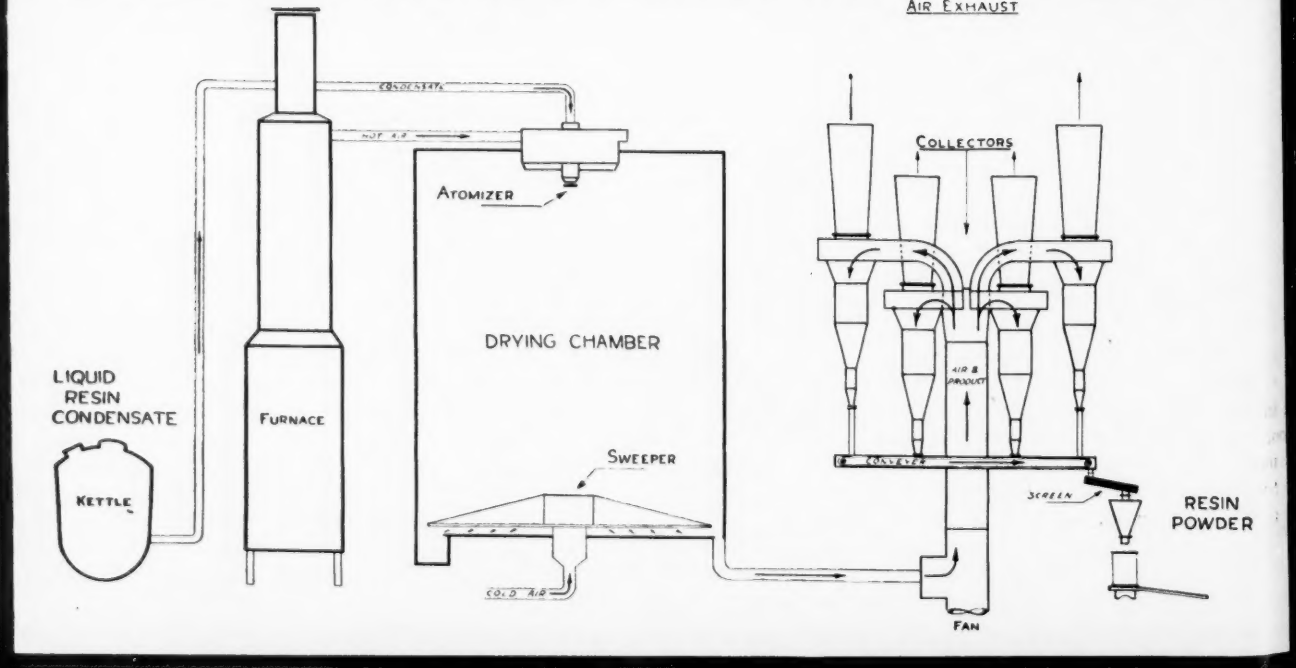
In order to keep up with the demand, manufacturers of resins have developed specialized equipment and have made many improvements in processes. Among the most important of these is the application of the spray drying method for the production of resin powders.

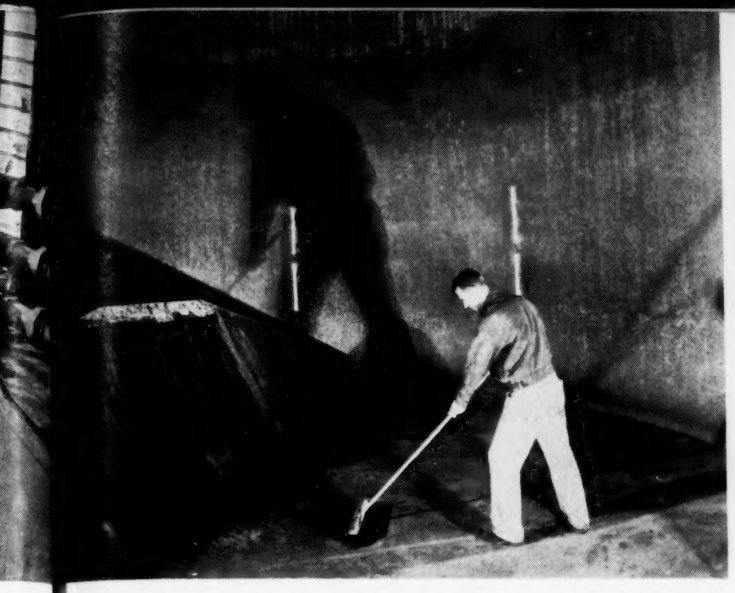
One of the latest of these installations, which has recently gone into operation at the Bridesburg, Pa., plant of the Resinous Products & Chemical Company, is described and pictured here. This unit, said to be the largest of its type in the country has increased production by nearly 500 percent, making available a great output of resin powder to help meet the still expanding demand. While this installation does not represent a radical departure from established practice, it embodies the most efficient advances in spray drying technique. Because of the dependence upon the relation of temperature, and rate of feed of the condensate for efficient operation, it is not possible to divulge all the facts concerning this equipment. However, the following brief outline indicates the normal procedure.

In the flow chart shown below, reading from left to right, the liquid resin, as an aqueous solution, is prepared in the kettle until the proper degree of reaction has been reached. It is then cooled to prevent further reaction and fed into the top of the drying chamber, a five-story cylinder. Here, the resin condensate is fed into a

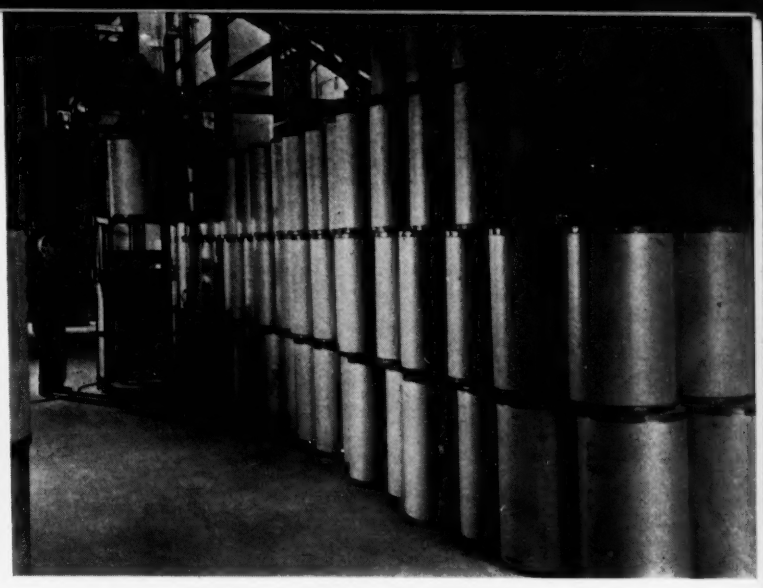
Liquid resin is fed into the top of heated chamber as a fine spray, dried by superheated air and falls to floor as dry powder.

The powdered resin is then carried through a duct to collectors from which it is passed through a series of screens into shipping containers.





Gigantic revolving knife blade of the resin spray dryer, brushing powder into ducts, then into collectors for deaerating and packing.



Weight and space saving urea-formaldehyde resins, that flow like water, are packed into simple, non-critical containers for shipment.

high speed atomizer wheel which converts the liquid to a fine spray. At the same time a blast of hot air is mixed with this fine spray. The heated air evaporates the water and the resin, as a fine powder, falls to the base of the chamber. This powder is so impalpable that, even at high production rate, the interior of the chamber has only a misty appearance rather than the man-made snowfall which might be expected.

At the base of the chamber, as shown in the flow chart, a sweeper blade rotated by jets of cold air, cools the resin and brushes it into the open duct around the base of the chamber. The powder, thoroughly aerated, is conveyed through the duct to the main feed of the collector. At the base of this feed line, which is about 4′ by 6′, there is a large fan which drives the powdered resin to the top, where it is diverted by smaller ducts into the collector units. These collectors, which look like gigantic ice cream cones, act as separators, the resin falling toward the narrow base, and the air emerging at the top.

As the powder accumulates at the base of each collector, its weight activates a series of trap doors, until the powder enters the conveyor. This carries the resin by means of a screw feed, to the screens above the dispenser. These screens, of a predetermined fineness, are agitated and the powder emerges as a uniform, free flowing product.

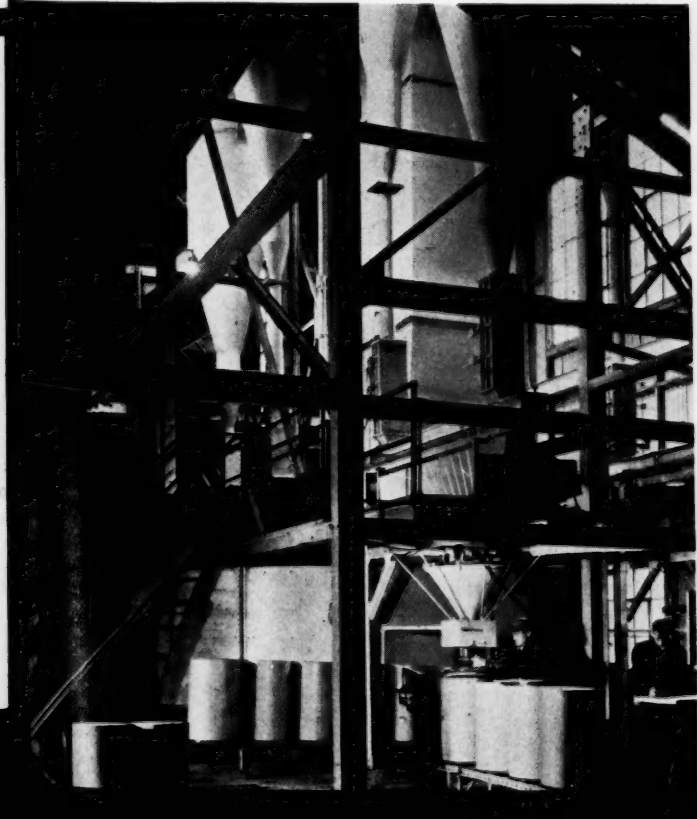
Both phenolic and urea formaldehyde type resins are produced in this equipment, each individual resin requiring adjustments of the process to yield the desired material.

The temperature of the air as admitted to the chamber is in the usual range of spray drier operations, about 500° F. The atomizer speed in spray drying operations of this type is in the range of 10,000 R.P.M.

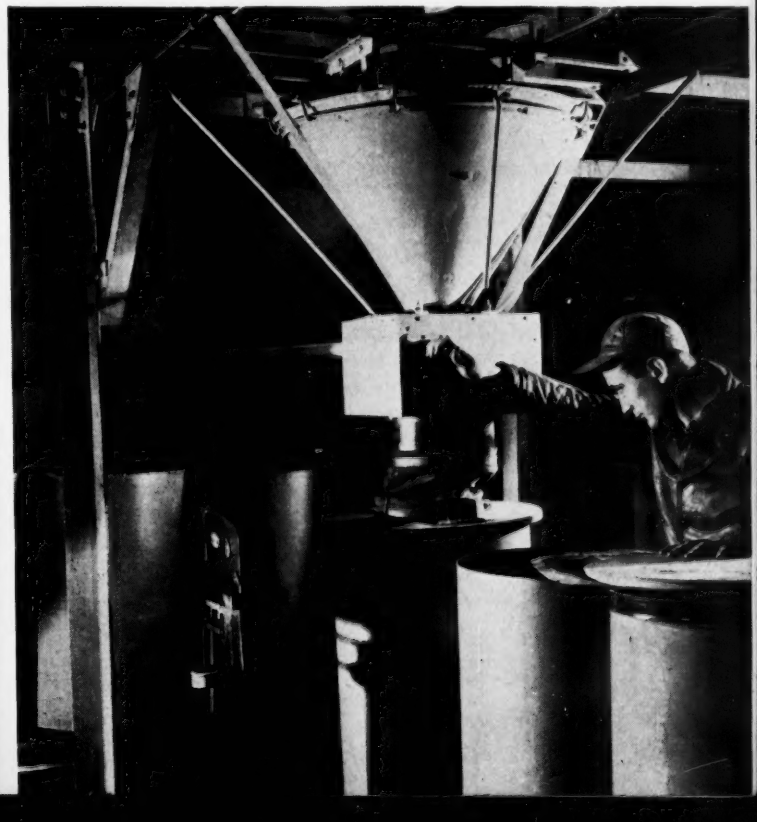
The speed of the atomizer wheel and its size determines the particle size of the final product, the higher speeds yielding finer particles.

Several advantages claimed for spray dried resins are storage stability much superior to liquid types; ease of handling and economy in shipping weight and storage space, which is especially important in wartime logistic planning; and the use of light-weight non-critical containers.

Interior shot of the world's largest spray-dried resin unit producing uformite 500, urea resin adhesive for plywood bonding.



Close-up of filling operation where the powder is packed into fibre containers as it comes from screens which insure uniform fineness.



ABC's of Electronics

by W. D. COCKRELL, Engineer, Electronics Section
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THE PERSON UNFAMILIAR with electronics is apt to be a little mystified and confused by the glowing promises of electronic things to come that are appearing so frequently in both the general and technical press. Actually, the electron tube is a simple mechanism based on laws of high school physics. Because its applications in the chemical industry are multiplying so rapidly, an attempt is made here to describe its functioning in terms of the essentially simple phenomenon that it is.

ARE electron tubes hard to understand? Anyone who understands the use of the simplest copper-oxide rectifier, the rheostat, and the direct-current voltmeter, can become a tube expert after one easy lesson—well, anyway, he'll know as much about an electron tube and how it functions in an industrial circuit as many of us need to know.

In the first place, every true electron tube is a rectifier—composed of at least two elements or electrodes enclosed in a vacuum envelope made either of glass or of metal. One of the two principal elements of each tube is called a "cathode." The cathode is made of special materials, and is heated, usually by a small electric heater, to release electrons—those fundamental particles of negative electric current.

Basic Principle Simple

Once, in the dim, dark past of high-school physics, we learned that anything charged positively attracts a negative charge. Then, in the next lesson, we learned that if the charge is negative, other negative charges are repelled. Thus, if we connect the other principal tube element, called the "anode," to a power source so that it is positive with respect to the cathode, the anode will attract the electrons from the cathode. But if conditions are reversed, and the cathode is positive and the anode negative, no electron flow will take place, because the anode is so made that it will prevent the loss of electrons. Thus, we get the one-way valve action of rectification; the electron flow (or the negative current flow, if you like to think of the normal current flowing from positive to negative) can move in but one direction through the tube—namely, from cathode to anode.

But that is not all. In these days of commando tactics, we are taught that it is most effective to kick a guy when he is off balance, or sock him when he is not looking. In a similar manner, if we can catch the current passing from cathode to anode in its simplest state, as a stream of electrons, we can control it with the greatest of ease. For instance, the electrons in an ampere-second of current weigh about a billionth of an ounce, something a lot easier to push around with a small control power than even the smallest and lightest switch or contactor. The control element added to the electron tube for this purpose is called a "grid," which is usually a spiral or grate of fine wires placed between the cathode and the anode. If the grid is held at a negative potential, with respect to the cathode, it tends to repel the electrons passing by it on their way to the anode, thus cutting down the flow of current, or possibly preventing it altogether. So long as the grid is negative, it pushes the negative electrons away, and thus collects no electrons to itself. No electrons means no current, and no current—even with a large impressed voltage—means no power. And to be able to control current without the use of power is a neat job!

Of course, if we make the grid positive, it will assist the flow of electrons to the anode and a larger current will flow, but only at the expense of some electron current to the grid. With the grid negative we can have control power for next to nothing.

The electron tubes that are used in industry may be divided roughly into three groups: phototubes, high-vacuum tubes, and gas-filled tubes.

A phototube is rather unique. It is a simple two-element rectifier in an evacuated glass bulb. The cathode is not heated to release the electrons, but is made of material which releases or "emits" electrons as light strikes it. These electrons can then be attracted as a small negative electric current to the positive anode. You might have guessed that the number of electrons which should be kicked out of the cathode material when light strikes a small cathode would not be very large; you would be quite right. We are lucky to get a millionth of an ampere, in most cases; and under certain conditions, the current is much less. In fact, the output is so small that in order to make use of it, we must boost it up or amplify it with a pliotron or thyratron, in order to operate even the smallest practical relay or motor.

Phototubes are the "electric eyes" of industry. Responding to a shadow or a flash of light, they may be used to count people, food, freshly painted articles, and other things which it is not desirable to touch, as well as to perform many other simple switching applications. In more advanced equipments, they can check or compare colors, read high temperatures, and control very rapid and accurate movements through the weightless and wearless light beams. The potential uses of the phototube are limited only by man's imagination.

Vacuum tubes which are simple rectifiers, and which have but two principal elements—the electron-emitting cathode and the collecting anode—are called kenotrons, or "diodes" ("di," indicating "two"). If we add one grid for the control of the electron stream, it becomes a "triode." All high-vacuum tubes with one or more grids are called pliotrons, or simply, amplifier tubes. Sometimes they are referred to by their function, such as transmitters, oscillators, or converters. If more grids are added in the electron stream to control the flow, as series valves in a pipe, the tubes may be called tetrodes (four-element, two-grid), pentodes (five-element, three-grid), etc. The typical vacuum tube is a low-current device which has a comparatively high voltage drop within the tube, yet it is capable of extremely fast and continuous control of the current with minimum grid power.

The pliotron is the familiar tube in radio receiving sets. Its role of amplifying a small signal or supplying a small output power is just as useful in industrial devices. Because of its characteristic of continuous control at extremely high frequencies, in the larger sizes it is used to supply the many kilowatts of power required for large broadcasting stations, or for induction and dielectric heating.

Gas-Filled Tubes

Gas-filled tubes, if used as rectifiers only, are called phanotrons; if they contain control elements, they are called thyratrons or ignitrons.

Thyratrons: A thyratron tube has a hot cathode to emit the necessary electrons, and a grid to prevent current flow, when desired. However, it also contains mercury vapor, obtained from a drop or two of mercury in the tube, or it may contain inert gas, such as argon or xenon

at low pressure. The gas or vapor helps to cut down the high internal voltage drop found in the pliotron. A constant voltage drop of about 15 volts is held for any value of current within the ability of the cathode to supply electrons. (This is done by a process called ionization.)

Because of this low drop, a thyratron of a particular size can be rated for a continuous current of 10 to 20 times that of a pliotron of the same physical size. Thyratron current ratings run into amperes; most of the pliotrons with which we deal will carry continuously only a few milliamperes.

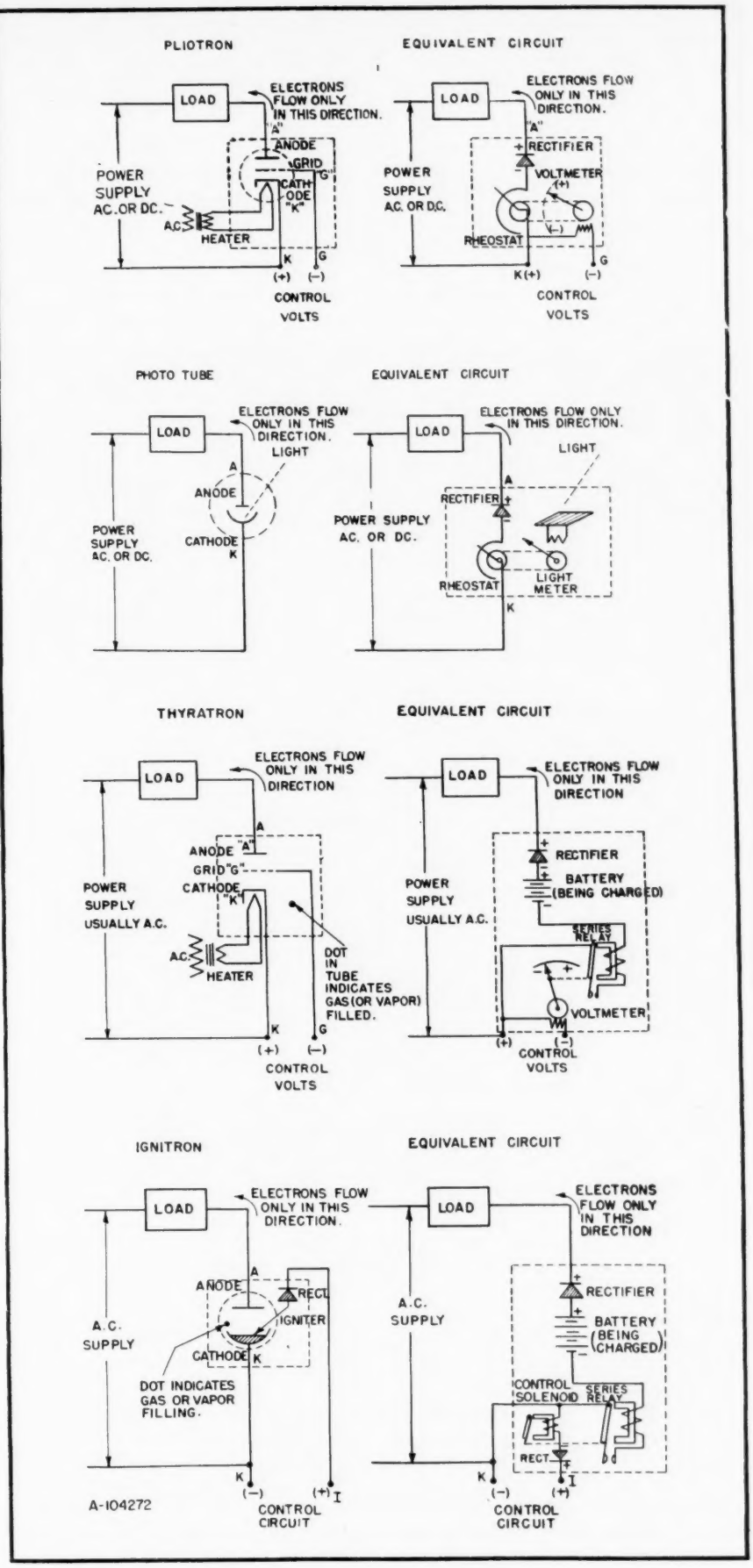
Negative Effects of Gas

But gas filling does have a few drawbacks. For instance, the maximum voltage of the controlled circuit is limited, but it is still well above the usual industrial control voltage range. Of more importance to us is the fact that the gas prevents the grid from controlling the current after the flow has once begun. In other words, a negative grid will prevent the flow of current as the anode is made positive; but once it has permitted the electron arc to start, it is powerless to stop it. The current can then stop only as the anode power is removed, or, in any a-c circuit, during the a-c voltage negative cycle. Even then, the deionization time required to regain control may be approximately a millisecond; therefore, thyratrons do not operate at frequencies much greater than the commercial power frequencies.

The thyratron is the handy-man of the industrial tubes. It controls meters, energizes magnetic contactors, and supplies small amounts of heat whenever accurate control or high-speed operations are required. Operating indirectly, by controlling generator fields or saturable reactors, it can control large amounts of power—many hundred horsepower or many kilowatts—for heat or lighting.

Ignitrons: The ignitron tube is similar to the thyratron in that it is a gas-filled tube, but it differs in that its cathode is not heated to free the electrons. Instead, its cathode is a pool of mercury and its electron-emitting energy is derived from the arc stream itself. This is a cumulative action—the larger the current the more electrons are made available. Thus, the instantaneous current capacity of the ignitron is limited only by the size of the elements and the leads to carry the heavy current. This may be thousands of amperes. The continuous current rating is determined by the ability of the tube to dissipate the heat losses. The larger sizes of ignitrons have built-in water jackets through which cooling water is circulated.

Since the ignitron, unlike the thyratron, does not have electrons immediately available at a hot cathode, its control element, the "igniter"—a pointed piece of crystal dipping into the mercury pool—must actu-



Wiring diagrams of electronic tubes and their equivalent electrical circuits. The pliotron current is usually in milliamperes, in the phototube, light controls a flow of microamperes, the thyratron current rating is usually in amperes, while that of the ignitron may be hundreds of amperes.

ally "blast" a few electrons loose from the mercury to start the arc stream. This requires real power; as much as 40 amperes at 200 volts, for a few microseconds. So it can be seen why the ignitron is most practical for high currents and large power requirements.

Ignitrons are the heavy artillery of the industrial tubes. They are called upon to control the thousands of amperes required for resistance welding. They rectify and control the large amounts of power needed for the manufacture of aluminum, in electrochemical processes, and for steel mill and factory direct-current shop voltages.

To sum up briefly: The phototube, using the energy of light to release electrons from its cathode, has so small an output in microamperes that a pliotron or thyratron must be used to amplify it to a useful value. The output of the pliotron (milliamperes) is sufficient to operate small relays, or to control a thyratron. Thyratrons, in turn, control amperes to operate large contactors, or motors in the usual control sizes from fractional horsepower up to 5 horsepower or more, or to control ignitrons. Ignitrons can handle hundreds of amperes, but require a reasonable amount of control power for operation.

How the Tubes Work

We said before that anyone who can understand a rectifier, a rheostat, and a voltmeter can understand tubes. Now we will prove it!

Take any kind of rectifier—copper-oxide or selenium—anything that will pass current in one direction and stop it in the other. Connect a rheostat in series and drive it by a voltmeter element, the positive terminal of which is connected to the negative terminal of the rheostat. Gear the rheostat to the voltmeter element in such a way that more negative voltage will cut in more resistance (see drawing). The rheostat is stepless, and goes to infinite resistance or open circuit at the high end. It is assumed that the voltmeter and rheostat can move extremely fast, 100,000,000 times per second; and the voltmeter is of extremely high resistance, perhaps a megohm or more.

This simple circuit can be used to replace a triode pliotron in any industrial circuit, and will do exactly the same job. If the tube is a tetrode or pentode, other series rheostat-voltmeter combinations may replace each grid. Nothing particularly tough about this circuit, is there?

Would you like a phototube? Then simply replace the voltmeter with an exposure meter so that increased light on the sensitive surface will move the meter element to cut resistance out of the rheostat (see drawing).

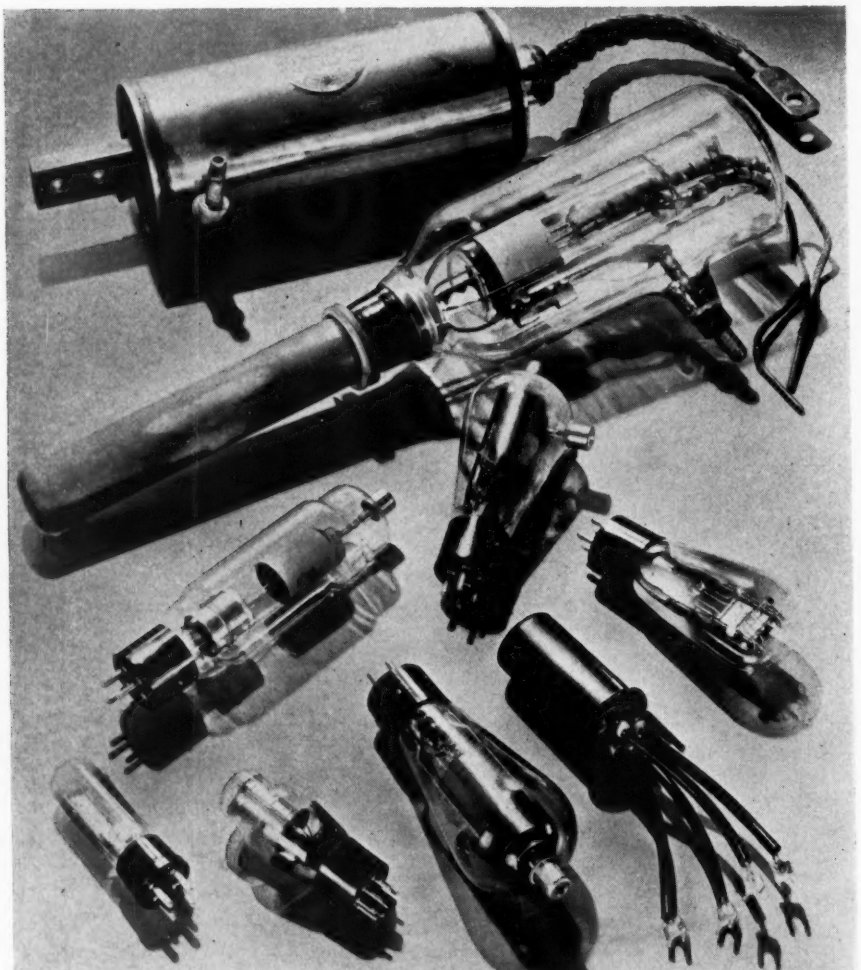
As for the thyratron and ignitron, they are no more complicated. In series with the rectifier we'll place a battery of about 15 volts and so connect it that it will be charged by the current which the rectifier permits to pass. (This corresponds to the constant arc drop of the thyratron for all current values.) Finally, in the circuit is a series relay that is connected to "seal-in" or "lock-in," when the circuit is completed through its own single, normally open contact. The relay armature is moved, and this contact is closed mechanically by the action of the control voltmeter (just as the rheostat turned, in the description of the pliotron). The contact moves to close as the voltage becomes less negative (see drawing).

Once the contact has closed, however, the holding power of the series relay is so great that the small voltmeter torque is powerless to open it again until the current has stopped flowing.

Ignitron Uses High Power

The ignitron equivalent is about the same, except that we must remember that we are dealing with larger power, and the size of everything becomes larger. In place of the voltmeter, we can use a small solenoid. A rectifier in series with the solenoid, to permit current to flow in but one direction, may not be necessary in our electromechanical picture, but it is necessary in the ignition circuit to prevent injury to the igniter by reverse current, so we'll put it in to make our picture complete (see drawing).

And that completes our one-lesson course on the industrial electron tube. We do admit that a few of the details about as essential as trouser cuffs and pocket flaps, have been omitted. But the fundamental facts are here, and we would like to prove it in this way. If you ever run into a wiring diagram that features one of these mysterious electron tubes that has been worrying you, do this: Before you lose any sleep or even get a vitamin "B" deficiency, just tear off a piece of an old war bond or ration book, paste it neatly over the offending tube symbol and draw thereon the appropriate equivalent symbol in a bold and steady hand. Then go right ahead and forget that electrons exist.



Tubes used in industrial electronics equipment. Included are the ignitron, pliotron, kenotron, thyratron, phanotron and phototube.

1943 Minerals Production

THE QUANTITY AND VALUE OF MINERALS and mineral products produced in the United States in 1943 exceeded all previous records. Here are some year-end estimates taken from the Bureau of Mines report to Secretary Ickes this month.

MINERAL production values reached the outstanding total of over 8 billion dollars in 1943, surpassing by 6 percent the record of $7,569,500,000 set in 1942. This increase resulted from higher prices realized in 1943 and from an increase of approximately 3 percent in the physical volume of production.

Of the estimated grand total of $8,030,000,000 in 1943, metallic products contributed $2,500,000,000 compared with $2,361,800,000 in 1942, a gain of 6 percent; mineral fuels, $4,566,000,000 compared with $4,084,600,000 in 1942, an increase of nearly 12 percent; other nonmetallic minerals, $964,000,000 compared with $1,123,100,000 in 1941, a decline of 14 percent. This decline reflected chiefly the sharp curtailment in non-military construction and the resultant falling off in markets for building materials.

In the metals groups, outstanding gains were registered in aluminum and bauxite, beryllium, magnesium, tantalite-columbite, and titanium; small to moderate gains were recorded for cadmium, chromite, copper, ferro-alloys, pig iron, manganese ore, and mercury production; and declines were noted in gold, silver, iron ore, lead, molybdenum, nickel, tellurium, and zinc.

In the fuels group, small gains were made in bituminous coal, and coke, and greater gains in petroleum, natural gas, and natural gasoline and liquefied petroleum gases. There was virtually no change in the production of anthracite.

Of the other nonmetallic minerals, crystalline graphite, potash, phosphate rock, magnesite, sheet mica, and salt showed marked increases, whereas cement, sand and gravel, clay products, gypsum, slate, sulfur, stone, and vermiculite experienced sharp decreases. The lime industry made a small gain over 1942.

Light Metals

Production of primary aluminum increased more than 75 percent from 521,106 short tons in 1942 to about 920,000 tons in 1943, and the value increased from $105,768,000 to $276,000,000. Construction difficulties and manpower shortages delayed the completion of the aluminum expansion program but by the last quarter of the year metal was being produced at an annual rate of 1,128,000 tons and it was apparent that an over-supply existed. Consequently, operation of three newly completed potlines was delayed and indications were that 6 to 10 additional potlines would be closed. Domestic production, together with imports of aluminum from Canada, were more than adequate to meet essential requirements during 1943. Domestic production of bauxite increased from 2,768,343 short tons in 1942 to 7,166,000 tons in 1943, by far the largest production in history, and imports of South American bauxite reached the record total of nearly 1,500,000 short tons. The bauxite supply greatly exceeded requirements and stock piles of more than 4,000,000 tons were accumulated. Alumina plants treated material higher in silica than in previous years due to additions of lime-soda-sinter equipment at several plants. Domestic production of bauxite was sharply reduced during the fall to rates more nearly in balance with consumption.

Production of magnesium increased from 47,420 tons valued at $21,216,414 in 1942 to about 185,000 tons valued at $76,000,000 in 1943. The output in 1943 was nearly 30 times that in 1940 and indicates the magnitude of the magnesium expansion program, substantially all of which was completed and placed in operation during 1943. The supply of magnesium exceeded consumption during 1943 and industry stocks increased markedly.

Despite the incentive of bonus prices, mine production of lead and zinc decreased in 1943 and copper production was only slightly increased. Manpower shortages were a contributing factor to the failure of the industry to make further gains over 1942. Smelter production of copper from domestic ores increased slightly from 1,087,991 tons valued at $256,766,000 in 1942 to about 1,090,000 tons valued at $257,000,000 in 1943. Production of refined lead declined from 467,367 tons valued at $58,888,000 in 1942 to about 425,000 tons valued at $53,550,000 in 1943 and, similarly, slab zinc declined from 629,957 tons valued at $109,613,000 in 1942 to about 585,000 tons valued at $101,790,000 in 1943. These values are calculated at ceiling prices and do not include premium payments.

Other Metals

Contrary to earlier expectations of a declining output, mercury production in 1943 advanced about 2,700 flasks over the 50,846 flasks produced in 1942 and represented the highest annual output since 1881. Mine production of antimony was nearly double that in 1943 and substantial gains were recorded in cadmium and beryllium.

Petroleum and Natural Gas

The record production of crude petroleum in 1943 is estimated at 1,503,000,000 barrels with a value at the well of approximately $1,818,000,000. Compared with 1942 this represents a gain of about 116 million barrels, or over 8 percent. The increase in value was largely due to the greater volume of production as the value per barrel is estimated to have risen less than 2 cents above the average of $1.19 in 1942. A small increase in crude stocks indicates that production closely approximated demand. The total demand for motor fuel in 1943 was about the same as in 1942, with increasing military requirements offset by the curtailment of civilian consumption due to the nationwide rationing of gasoline effective on December 1, 1942. The total demand for the other two major products residual and distillate fuel-oils, apparently showed an increase of about 14 percent compared with 1942.

The marketed production of natural gas in 1943 is estimated at 3,369 billion cubic feet compared with 3,053 billion in 1942, a gain of over 10 percent. The output of natural gasoline and related products in 1943 is estimated at about 3,700,000,000 gallons, a gain of nearly 6 percent compared with 1942.

Fertilizers

Contrasted with our meager supplies of potash during the World War of 1914-18 the domestic plants produced an all-time high of about 700,000 tons K_2O equivalent during 1943, but even this record output could not keep pace with increasing agricultural demands. Under the same incentive, phosphate rock production increased about 4 percent to reach an all-time high of about 5 million tons. The heavy demands for both explosives and fertilizers kept nitrate plants operating at maximum output.

Chemical Raw Materials

The growing needs of the synthetic rubber and other chemical industries stimulated a 15 percent increase in sales of salt. Chemical industries contributing to both fertilizer and military requirements drew heavily upon sulfur, consumption being considerably greater than in 1942. Production, however, was much less than in 1942 as large quantities were withdrawn from stocks. Barite sales declined about 6 percent. The output of strontium minerals that have important military uses was nearly double that of 1942. Lithium minerals are likewise devoted to specialized war applications which stimulated a 50 to 60 percent increase in sales.

Some Physical Chemical Aspects of WAX EMULSION POLISHES

CHEMICAL SPECIALTIES

by CHARLES S. GLICKMAN, Consultant on Waxes

IN THIS FIRST OF TWO ARTICLES on wax emulsion polishes, the author presents a new concept of the relationship between the emulsifying agent—or soap—and such performance characteristics of the finished product as color, spread, gloss, stability, surface tension and water resistance. The refractometer as a means of controlling gloss and solids content is also discussed. The second and concluding part of the article will be presented next month.

STUDY of the so-called water emulsion waxes from a purely scientific viewpoint is a difficult matter. One handicap is the inaccuracy of the name itself. Scientifically speaking, these products are not emulsions at all but are *colloidal wax suspensions* in an aqueous medium. The use of the term "emulsion" presupposes two liquid phases, and since the disperse phase in these products is composed of waxes and/or resins—both solids at ordinary temperature—it is impossible for it to be a true liquid phase in the finished product.

Twelve years of intensive study of the components and physical processes involved in the preparation of colloidal wax suspensions have led to the formulation of certain theories and conclusions by the writer. Some of the latter are here presented and interpreted in the light of actual physical and chemical phenomena encountered in the plant and laboratory.

There are three basic components in the colloidal wax suspension system. These may be broadly defined as the vehicle or *continuous water phase*, the *disperse phase* (waxes and/or wax-resin mixtures) and finally the emulsifier or *protective colloid* (soap). Current theories on the latter locate it as a layer surrounding the disperse phase and extending molecularly into both the continuous and the discontinuous or wax phase.

The emulsifying agent, or soap, controls the degree and stability of the dispersed gloss-producing compounds. The degree of *spread* or wetting—a function vital to the performance of the product—is directly controlled by the amount and type of this single component. It will be proven in a later portion of this discussion that *water resistance* is governed entirely by the amount and not the kind of emulsifier used in the process. By adjustment of the amount of soap or protective colloid, it will be shown that the actual *color* of the polish can be controlled and adjusted. That the stability of the product is immediately dependent upon and governed by the amount and type of soap will be illustrated and proven. We may therefore consider, subject to proof, that no physical or performance characteristic of the wax dispersion is free of the influence of this comparatively small amount of highly important material.

Critical Emulsification Ratio

All combinations of waxes, or waxes and resins, exhibit what this writer has termed a *critical emulsification ratio* (C. E. R.). This expression may be defined as the ratio of dispersed materials (waxes, resins) to soap which may be rendered into a colloidal state in an aqueous vehicle and which will result in a product having desirable characteristics of gloss, spread, stability, color and water resistance (if this latter is necessary). This value is a mean, empirically determined through observations of a variety of products and processes.* Naturally it must and does differ between different types of soaps such as soda and amine oleates. For example, one of the commonest emulsifiers—triethanolamine oleate—exhibits a C. E. R. value of about 2.8 for carnauba dispersions whereas for mixtures of candelilla, carnauba and thermally processed resins or terpene derivatives, the value appears to be about 3.5. This may be interpreted to mean that for carnauba, the optimum ratio is about 2.8 parts of wax to each part of tri-oleate soap, and for the wax resin mixture the ratio is about 3.5 parts of the latter to each part of the soap. If we consider morpholine oleate as an emulsifier, we find that the C. E. R. value for that soap and carnauba is about 2.4.

Since soap has no wearing power or resistance to abrasion, it is desirable to prepare products having as low a soap content as possible, providing all the other performance characteristics are fulfilled. The C. E. R. value of a particular emulsifier acquires further commercial significance when it appears that the cost of an emulsifier required to produce water resistant products is higher per pound than the cost of the dispersed material. How water resistance may be obtained by the use of very low priced soaps will be illustrated in detail.

It must be considered that the C. E. R. value for any particular type of protective colloid is a partial function of the compound being dispersed. We may therefore expect, and we will find, that the same soap will yield different values for different formulations. It should be noted, however, that such differences as will be found will not be extreme, and in the case of carnauba formulations, will actually not deviate more than about ± 1.0 from the value for pure carnauba. The value is generally higher where resins are included in the formulation.

In contrast to the relatively low values indicated for tri and morpholine oleates, a great number of the commercial flake or bead soaps exhibit C. E. R. values ranging from a low of about 6 to a high of 15 or 20. No theoretical explanation of this phenomenon can be advanced in the light of the determination of the interfacial tensions of these emulsifiers against any of the usual dispersible compounds such as waxes or resins. If we examine these variations in C. E. R. in the light of two rarely considered factors, namely hydrocarbon solubility and chemical stability against possible hydrolysis, then a satisfactory explanation becomes possible. This latter factor—*hydrolysis*—makes possible further chemical reactions between the dissociated components of the emulsi-

* The actual numerical C.E.R. value is obtained by totalling all the dispersed materials (waxes, resins, etc.) and dividing by the total weight of alkalis and fatty acids. Any alkalis used in the preparation of added resin solutions such as shellac or manila solutions, should not be included in the calculation. The weight of resin should also be disregarded unless it is actually dispersed simultaneously with the wax.

fying agent and saponifiable elements of the dispersed compound. Each of these possibilities will be duly discussed.

Let us first examine the possibility of hydrocarbon solubility. Soaps prepared from the amines or aminohydroxy compounds are known to exhibit more definite properties of hydrocarbon solubility than soaps prepared from soda or potash. The ammonium compounds of the corresponding fatty acid or acids exhibit combined characteristics since they possess the solubility of the amines and the insolubility of the caustic alkalies. In other words, ammonium soap solubility would be partially expected.

Let us prepare a theoretical batch, examining the various physical and chemical reactions taking place in the kettle. As our dispersible solids let us select a mixture consisting of a natural vegetable wax such as carnauba or candelilla or a mixture of both. Let us modify this with an added amount of a thermally processed natural gum or a synthetic modified terpene resin.

To this is added a known amount of alkali such as an amine or even a concentrated solution of a caustic—soda or potash. Under conditions of heat and agitation, saponification takes place with the formation of a practically anhydrous soap dispersed in the wax-resin mixture. A secondary addition of a milder alkali such as a concentrated borax solution may then be made. This is also dehydrated in turn. The reaction is completed physically and chemically by the addition of boiling water with consequent emulsification of the dispersed components in the presence of the soap or protective colloid. This in turn is followed by a phase reversal from the water-in-wax state to a wax-in-water system which is automatically accompanied by the alteration of the *emulsion* to a *colloidal wax suspension* due to the loss of heat by the system with consequent crystallization of the wax-resin content.

If we have been dealing with an amine type soap, we may assume that during the saponification phase of the reaction some portion of the emulsifier has been rendered colloidally inoperative because of its solubility in the wax. This would leave a lesser amount of soap available for use as emulsifier, with consequent insufficient protection against instability. We therefore in the case of the amines have to compensate for this loss of emulsifier by originally starting with a greater proportion of emulsifier to soap. With the caustic alkali soaps, no such dissolving takes place, or even if it does, the amount involved is so small as to be negligible.

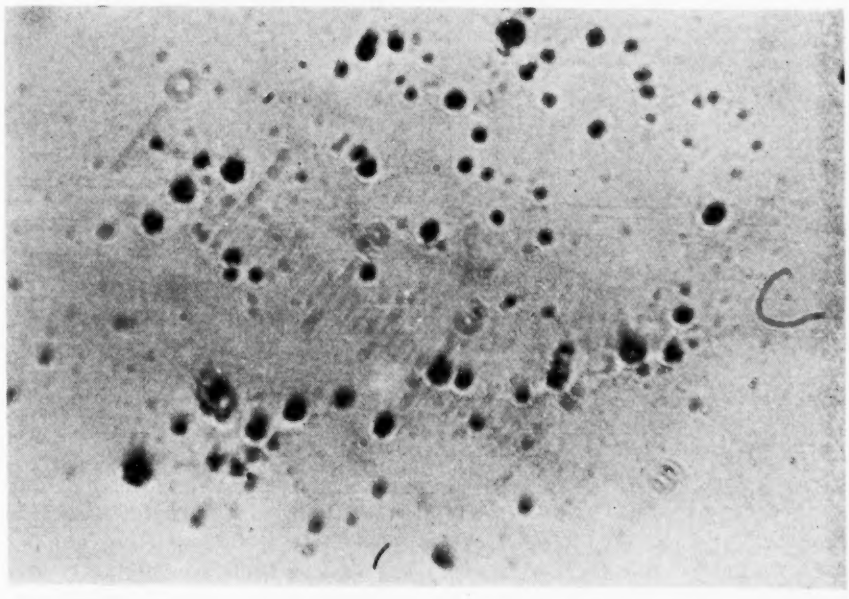
We will therefore find in the first case lower C. E. R. value required than in the second case. This is in agreement with the actual facts.

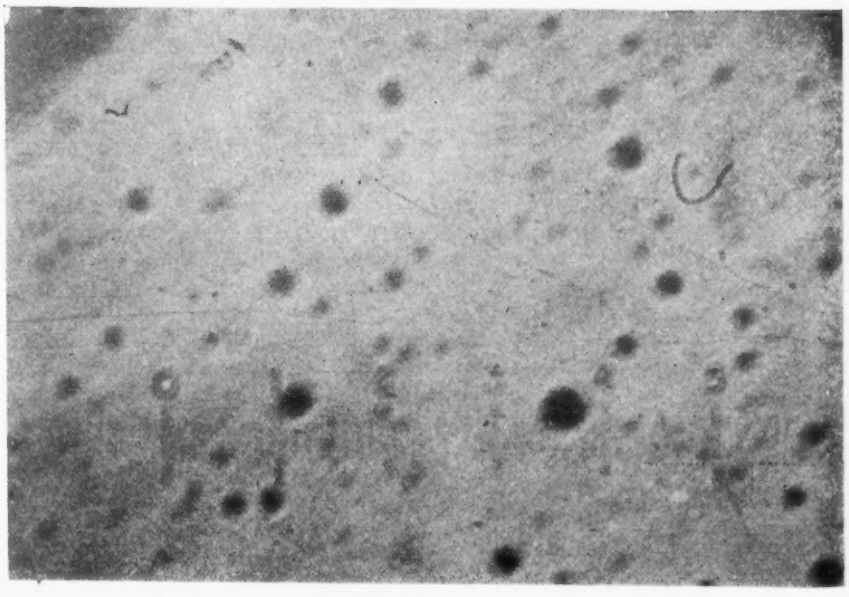
Now let us consider the second possibility which may take place in the kettle. When amine soaps are exposed to relatively high temperatures such as are present during wax processing, some decomposition may take place. It may also be possible that amine type soaps may be more readily hydrolyzed in the presence of traces of moisture or even in the melted hydrocarbons (waxs, etc.), particularly so where vigorous agitation is part of the process. The liberated alkali may then react with a part of the saponifiables present in the wax and/or resin with consequent reduction in the amount of oleate soap originally calculated as present in the formulation.

It is definitely established that there are differences in the relative emulsifying capacities of different soaps wherein the type of alkali is the same but the fatty acids vary. We would therefore expect in this case that an amine emulsifier must be present in greater proportion to the amount of wax, etc., than would be required if a non-amine type of emulsifier were utilized. Such is actually the case, and formulators have automatically made this compensation without realizing why it was necessary. In other words, sufficient excess of amine has been added to compensate for its future loss due to saponification of the dispersed solids.

That this hydrolysis followed by saponification is probably the real reason for the loss may be readily established by making a small trial batch in the laboratory and replacing the amine portion of the soap by a caustic alkali. It should be remembered that the increase in emulsifier efficiency may result in instability of the system—*gelation*—due to the presence of excess soap and therefore it will likewise be discovered that a smaller amount of a caustic alkali soap is required to produce a product of the same color and other performance characteristics as was obtained in the amine-fatty acid emulsifier formulation.

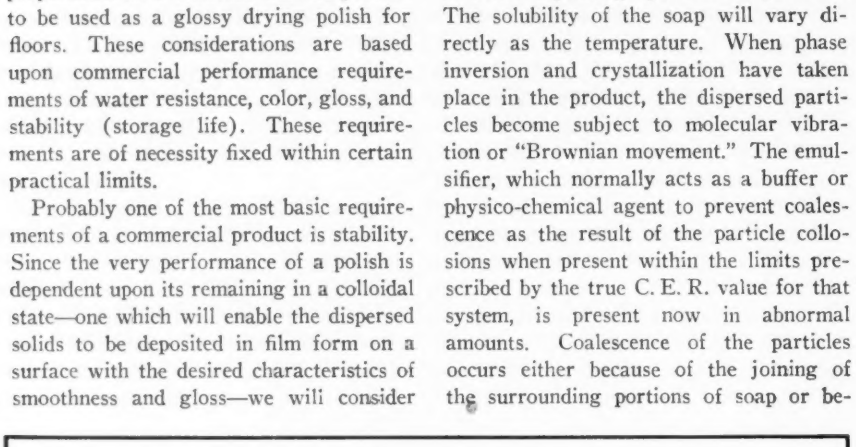
Photomicrographs of a wax dispersion in water using a triethanolamine oleate emulsifier. Magnification 18,000x. and 30,000x.





There are further considerations other than cost in the estimation of the value of any particular emulsifier for use in the preparation of a colloidal wax suspension to be used as a glossy drying polish for floors. These considerations are based upon commercial performance requirements of water resistance, color, gloss, and stability (storage life). These requirements are of necessity fixed within certain practical limits.

Probably one of the most basic requirements of a commercial product is stability. Since the very performance of a polish is dependent upon its remaining in a colloidal state—one which will enable the dispersed solids to be deposited in film form on a surface with the desired characteristics of smoothness and gloss—we will consider how this colloidal state may be maintained and what factors will tend to alter it.



Relationship of Refractive Index to Solids Content

There are certain limiting points which the soap content of any given formulation must not exceed if gelatin and improper formation of the desired colloidal state are to be avoided. If the lower value is exceeded—that point beyond which no proper degree of emulsification takes place due to the presence of insufficient protective colloid—then no proper product is even formed. This phenomenon would be the result of too high a C. E. R. value. However, the condition is one which rarely arises and is only present when new formulations are being tested in the laboratory. The other case, however, is more in evidence and occurs where the formulation has too low a C. E. R. value due to the presence of excessive soap.

Let us again examine a theoretical batch being prepared in the kettle. We have inadvertently used too high a percentage of soap. The normal amount of protective colloid sufficient to wet properly or maintain in suitable suspension the dispersed phase has been exceeded and the excess soap, be it a hydrocarbon soluble (amine) or a non-soluble (caustic) type, is dissolved or suspended in the aqueous continuous phase. This soap is "soluble" within certain definite limits of its own in water depending upon the temperature. The solubility of the soap will vary directly as the temperature. When phase inversion and crystallization have taken place in the product, the dispersed particles become subject to molecular vibration or "Brownian movement." The emulsifier, which normally acts as a buffer or physico-chemical agent to prevent coalescence as the result of the particle collosions when present within the limits prescribed by the true C. E. R. value for that system, is present now in abnormal amounts. Coalescence of the particles occurs either because of the joining of the surrounding portions of soap or because the excess soap present in the aqueous phase actually forms a gel of its own with the result that the entire preparation appears to solidify. It is known that soaps will form gels with water when present in certain amounts.

Now let us reconsider the case of the insufficient amount of soap—an amount just barely enough to enable the emulsion or suspension to take place. We may find the following: some point midway between the first addition of water and the 50% point of water addition, the mixture in the kettle loses its clear or colloidal appearance, depending upon the amount of water present, and assumes a dull, yellowish, viscous appearance. This may be accompanied by actual separation of the wax phase from the water phase.

Still another condition may arise from the same cause. The product may appear to be properly formed in the kettle with the possible appearance of a somewhat lighter color than usual together with the added feature that when placed on glass it does not wet perfectly. Failure to produce typical Tyndall blue fluorescence is still another symptom. In any event all of these phenomena are merely precursors of events to follow. Gelatin is the final result.

We can therefore draw the general conclusion that the determination of the optimum C. E. R. value for the particular soap being employed is vital to the life and performance of the product. A more elaborate definition of the optimum C.E.R. value would be that dynamic balance between the soap and the dispersed elements which exhibits maximum performance characteristics and physical stability.

Color

It has been experimentally determined that in any given system of the type under discussion the particle size may be decreased with increase in the soap content. *The particle size varies inversely as the optimum C. E. R. value.* The change in actual color from a lighter to a darker hue likewise varies inversely as the soap content. With increased colloidal dispersion there is a closer approach to actual transparency, absence of Tyndall blue fluorescence, and diminution in reflected gloss.

The association of loss of gloss with actual decrease in particle size may seem erroneous, but the explanation is simple. It is definitely possible to alter the color of any given wax emulsion from a lighter hue to a darker one or vice versa, provided the initial C. E. R. value is not too extreme, by varying the soap content. This holds for any type of soap, but the actual range of variation in C. E. R. value will be broader or narrower depending upon the characteristics of the emulsifier as related to the types and relative amounts of materials dispersed. Since the color of the suspension is a function of the refractive indices of both phases as well as the particle size, complete absence of cloudiness or attainment of transparency may be achieved by reduction of the particle size to a point where light refraction is no longer evident. In other words, the particles proper are smaller than the wave-length of the light passing through the solution.

The ultimate hue of any wax suspension is always some variation of the inherent color of the waxes or wax-resin combinations which comprise the disperse phase. North Country carnauba, for example, will yield products of a gray or blue-gray color when inexcessively dispersed. However, when dispersed to the ultimate degree, the liquid assumes a steel blue appearance. Ultimately dispersed yellow carnauba will yield a light-colored clear amber product and when less dispersed will yield cream to white colored products. If congo, candelilla and carnauba are dispersed together, a gray to tan colored product will be produced.

We therefore cannot expect a white product from any combination containing congo, oricury, candelilla, montan, or

carnauba other than yellow carnauba. However by proper adjustment of the C. E. R. value with its resultant effect on the degree of dispersion, we may be able to achieve some marked degree of lightening. It should be of theoretical interest to note that colloidal dispersions of paraffin, ceresine or ozokerite (the white grades, of course) will appear as colorless transparent solutions when the ultimate division of particle size has been attained. It should be further noted, however, that such preparations have no commercial value in that their life is relatively short—generally a matter of a few hours.

Gloss

Gloss is one of the primary requirements of a commercially saleable wax polish. Of course we have all seen examples where the presence of this particular feature in the product required psychic properties of discernment on the part of the observer. Such exceptional cases, however, are not being considered here.

All formulators have at one time or another experienced difficulty in maintaining the same degree of gloss batch after batch, although all factors were supposed constant. This non-uniformity of gloss, if we do not consider any other variable such as differences in the amount or physical and chemical properties of the reaction components, is primarily due to differences in particle size. If we take any known formulation and merely alter the C. E. R. relationship so as to produce two products—one with the usual formula and the other with such an excess of soap as to produce a colloidal solution (that state wherein the product no longer exhibits fluorescence and appears transparent)—we will find upon application that the transparent one does not have the same degree of gloss as the lighter colored one with the larger particle size.

The application of a colloidal aqueous suspension of a wax to linoleum or other surface, results in the formation of a *discontinuous film* composed of discrete particles whose individual size is larger than the wavelength of light. If the particle size is larger, then we become aware of what we term reflection of light. If the particle size is smaller, as we would find in a transparent product, then the light instead of being entirely reflected is partially absorbed, with resultant loss of gloss. The larger the particle size, up to a certain point, the closer we approach the continuous film which exhibits the maximum gloss. When we buff any film of wax, we tend to convert the discontinuous film into a continuous one, relatively speaking, with consequent increase of gloss. This factor of continuity of film explains why a film of lacquer cannot be buffed to a higher gloss whereas a film of discontinuous wax particles may be made to appear glossier. *The optimum range of particle size with respect to gloss is usually accompanied by Tyndall blue fluorescence.*

Refractive Index as a Function of Gloss

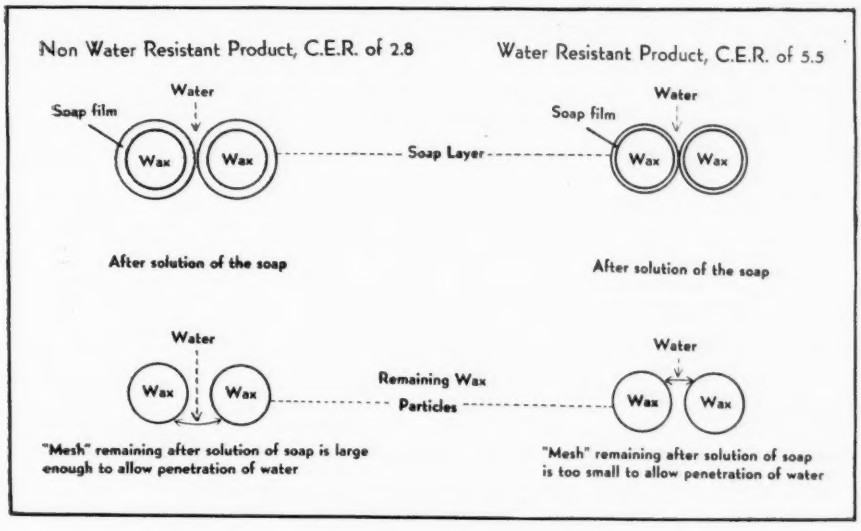
The relationship of refractive index to the properties of aqueous colloidal wax suspensions has never been fully studied or described in the literature. *The refractive indices of the components other than water entering into the production of an aqueous glossy drying wax polish control the gloss it is possible to obtain from that product provided the formula and particle size are not altered.*

Tests on a number of commercial formulations having solids contents of 12-12.5% indicate a range of refractive indices as obtained on the Abbe refractometer from about 1.355 to about 1.365 for n/D at 23° C. The general average was 1.358-1.360 for n/D at 23° C. It should be remembered that the higher the refractive index the higher the gloss.

A review of the literature reveals the following refractive indices for the components commonly used in wax suspensions:

Carnauba wax	1.472/40° C.
Candelilla wax	1.456/71° C.
Beeswax	1.440/75° C.
Ozokerite (Ceresine)	1.4414-64/75° C.
Manila gum	1.526-40
Congo gum (run)	1.545
Shellac, orange	1.516
Shellac, bleached dry	1.534
Pontianac	1.545
Sandarac	1.545
Cumar	1.617-45
Chlorinated diphenyl	1.703
Myristic acid	1.431
Linoleic acid	1.469
Lauric acid	1.427
Palmitic acid	1.426
Stearic acid	1.430
Oleic acid	1.462
Triethanolamine	1.490/20° C.
Diethylene glycol diabietate	1.5361/20° C.
Ethylene glycol diabietate	1.5330/20° C.
Hydrogenated methyl abietate	1.517/20° C.

It should be noted that the refractive index of the waxes is comparatively low as compared with the synthetic resinous compounds and the natural resins. The fatty acids are about on a level with the waxes, however. It is a known fact that the refractive index of a mixture is an arithmetic average of the indices of the individual components. By mixing materials of low refractive index with other compounds of a higher refractive index it is possible to obtain a mixture with a value midway between the lowest and highest values of the individual components. Since gloss, furthermore, is a function of the refractive index, the formulator should select materials which will yield as high a refractive index as possible. That we can vary the gloss of a product and indirectly its refractive index by adding materials of higher value, has been proven by commercial procedure wherein solutions of manila gum or shellac are added to wax solutions with resultant increase in luster.



Graphic presentation of "sieve" theory of water resistance

Since the refractive index of triethanolamine oleate is somewhat higher than that of carnauba wax or candelilla, it might be theoretically possible to increase the gloss of a wax polish by increasing the soap content. Experiment has proved that such is the case.

This can be demonstrated in another way. If an equal amount of pure soda soap is used in place of a tri soap, the gloss is reduced. However, due to the fact that a lesser amount of soda soap is required for achievement of the same degree of dispersion, the amount of soda soap used can be reduced without loss of gloss.

All colloidal systems of the type under discussion exhibit a specific refractive index which varies according to the kind and proportion of the dispersed components. Experiments have indicated that the refractive index is also a function of the *percent of solids* present. The accompanying graph indicates the values obtained as a commercial polish is diluted with water. The percent solids is plotted

against the change in index value, and it will be noted that the result is a straight line relationship. In other words, *refractive index varies directly with percent solids at a constant temperature and with a given ratio of solid components.*

This relationship will prove valuable in the examination of batch samples as they come from the kettle. All that is necessary to determine solids content is to take a refractive index reading—an operation done in a few minutes as opposed to several hours for a regular solids determination made in the oven. This method of determination also can serve the purchaser of a wax in that by a determination of the refractive index he can get a rapid check on solids content and an indication of whether or not the proper materials have been used.

The relationship between refractive index and gloss explains why compositions utilizing certain of the thermally processed natural resins or synthetic modified and/or unmodified terpene resins as extenders for natural wax or components of so-called "synthetic waxes" and "wax substitutes," achieve a high degree of gloss.

Water Resistance

The theory of water resistance of water wax polishes is relatively simple when considered from the standpoint of the C. E. R. value. That this phenomenon is directly based upon the *amount* and not the *type* of soap will come as a distinct surprise, but careful examination of experimental data will provide an explanation.

Numerous experiments using a wide variety of dispersible solids including various types of mineral and vegetable waxes together with numerous natural and thermally processed natural resins, synthetic resins and modified natural resins in conjunction with an equally wide variety of emulsifying agents ranging from amine soaps to wetting agents and pure commercial soap flakes and powders have all led to one definite conclusion. *Water resistance is a direct function of the C. E. R. value.**

Water resistance becomes a positive factor when the C. E. R. value reaches a critical value of about 5.0. In the experiments mentioned above, the type of soap was shown to have no bearing on the resultant property of water resistance as long as the ratio of dispersed solids to soap was 5 to 1 or greater. Below this limit, the so-called stable soaps, to differentiate between caustic-fatty acid emulsifiers and amine types such as morpholine oleate or ammonium oleate, did not prove completely water resistant. A slight exception to this statement should be noted, and this will be explained. The unstable soaps of the amine variety create the property of water resistance by decomposing to some extent on contact with air at room temperature with the result that the wax-soap ratio is actually increased, thereby fulfilling the requirements of the C. E. R. water resistance theory. The loss of volatile alkali causes an increase in the amount of water insolubles in the dry film.

To return again to our original premise that this property may be made a positive one by utilizing soaps which are normally considered to be water soluble or dispersible, let us select as an example sodium or potassium oleate. There can be no question as to their solubility in water. It has been previously stated that these soaps present relatively high C.E.R. values as opposed to tri oleate. The explanation of water resistance in the presence of extremely soluble soaps can be easily demonstrated.

Let us first consider an analogy. We know that a sieve of 10 mesh will not retain water. If we increase the mesh to 100, we note that some water is retained. If we further increase the mesh to 350, we note that the sieve retains an appreciable amount of water. That primarily is what happens when a film of wax having an initially low C. E. R. value is exposed to water. The film whitens and is removed. When we expose a film of wax having a high C. E. R. value, we find that it is water resistant.

This phenomenon is not a characteristic of the mode of application, but may be explained as follows: In any application of a wax polish, the wax particles are deposited in a random fashion which results in a film consisting of several layers of wax particles all separated approximately the same distance from one another. We know that these particles (present in a discontinuous film) in reality form a sieve or mesh. If the film so deposited contained no water-soluble material then there would be no question of water resistance, but unfortunately water soluble soaps are required for the preparation of the suspension and so we must of necessity have water soluble material present. When water is brought into contact with this film, the soluble portion is leached resulting in a mesh whose size is entirely controlled by but a single factor—the infinitesimal amount of soap which originally surrounded each and every wax particle. If the space between the remaining particles is now large enough, the screen or mesh will not retain water and will show whitening or actual removal due to penetration of the water down through the film to the original surface. If the space remaining is small enough, then water will not penetrate the film and no loss of gloss or actual material will result. The loss of water-soluble material will directly depend upon how much is originally present in the film, and that in turn depends upon the C. E. R. value. A visual description of this "sieve" theory of water resistance is given in the accompanying diagram.

Let us examine another proof of this theory. Let us reverse the procedure and take a product made with morpholine oleate which we definitely know to be water resistant. Let us deliberately increase by twofold or threefold the amount of morpholine oleate originally used. Upon application of water to the dry film we will now note that it is no longer as water resistant.

If we further consider the phenomenon of water resistance as presented by films containing morpholine oleate, certain peculiar features appear. Morpholine oleate emulsifiers require an excess of alkali (the amine) in order to function properly as emulsifying agents. All the morpholine in a film is not removed immediately when exposed to air. The loss is gradual, with increasing water resistance. If we take three slides and coat each of them with the wax and expose them to air and then at 15 minute intervals dissolve the film in warm water, working rapidly so that little loss of morpholine from the solution takes place, and then take the pH of each successive sample we will note that this value gradually lowers with the increase in drying time.

Certain exceptions to the C. E. R. theory arise out of properties peculiar to certain dispersible compounds. Whether these properties arise out of differences in the interfacial tension or the fact that they probably possess less solubility for the same soaps than carnauba wax, cannot be determined at this time. It is known, however, that the presence of candelilla wax, thermally processed congo resin, or mineral waxes such as ceresine or ozokerite will cause variations in the normal C. E. R. value required for the preparation of water resistant films. These effects cause a general reduction in the C. E. R. value required for positive water resistance to an extent of about 1.0. This is especially true where large proportions of congo are present.

It will be noted that this entire theory is predicated upon the existence of a layer of soluble soap surrounding each and every wax particle. The photographs on page 61, obtained with the aid of special lighting, illustrate the existence of this layer.

(The second and concluding part of this article will appear in February.—*Editor.*)

* Water resistance as herein defined is tested for by applying a single thin coat of the wax to clean linoleum and exposing the dry film to a stream of running cold water (through a faucet) for a period of 10 minutes immediately following the drying of the film. The film should show no whitening then or after drying.

ALUMINA from Clay

A Current Summary of Products and Processes

COUPLED WITH the shutting down of some aluminum plants in the East and statements by government officials that we now have "aluminum running out of our ears," word last month that WPB had again given the go-ahead to the three alumina-from-clay developmental plants originally approved by the National Academy of Sciences but later stopped by WPB, was received with mixed feelings. There were indications that political considerations were being injected into a situation already beclouded with conflicting testimony and interests. On one thing, however, all parties seemed to be in agreement: even if now permitted to proceed without interruption, alumina from clay could not possibly become much of a factor in U. S. production of aluminum until 1946 at the earliest.

This virtually divests the whole program of any important war significance. Alumina from clay can be of wartime value only if the European battle is still in progress in 1946 and we lose control of the Caribbean waters sufficiently to permit enemy sinkings of bauxite boats coming up from the Guianas, a rather unlikely prospect at the moment. As it is, domestic and Guianan bauxite is serving current needs amply and cheaply.

Reopening of the clay program, however, again focuses attention on the several processes involved, their characteristics and relative advantages and disadvantages. The three developmental plants that are to be erected with Defense Plant Corp. funds are those of Ancor Corp., which is to be located in South Carolina and will operate on local kaolins; Columbia Metals Corp. at Salem, Oregon, which will use Pacific Coast clay: and Monolith Portland Midwest Co. which will use feldspar at Laramie, Wyoming.

Lime Soda Sinter Process

All of the alumina-from-clay processes are concerned with the basic problem of separating the alumina from other materials in the clay, principally iron and silica. Ancor will use what is known as the lime soda sinter process. This consists of first working crushed limestone and mashed kaolin clay in a tube mill, a little over two and one-half tons of limestone being required per ton of clay. The mixture from the mill is filtered and the clay and limestone cake calcined in a rotary kiln, driving off carbon dioxide. The sinter is leached with a sodium carbonate solution which gives sodium aluminate contaminated with silica. This product is suitable for processing in a Bayer plant such as those now in use by the Aluminum Company of America for purifying bauxite, or it can be recrystallized under pressure to get rid of the remaining silica and then treated with the recovered carbon dioxide to precipitate aluminum trihydrate which is filtered off and calcined to alumina in a rotary kiln. The Monolith Portland Midwest Co.'s process is similar to this one, both coming under the heading of alkaline processes. Also similar is the red mud reclamation process developed by Alcoa for recovering alumina carried down with the silica when the Bayer process is used on bauxite.

There seem to be two primary handicaps that the alkaline processes will have to overcome if they are to compete with imported bauxite after the war. These are, first, the cost of limestone and coal. About five tons of limestone and one and one-half tons of coal are required to produce each ton of alumina. Secondly, locations where both clay and limestone are available in the quantities needed are few and far between. One authority claims that there are only about five such locations in the United States. Advantages of the alkaline processes, on the other hand, are that they offer a byproduct credit in calcium silicate, a material useful in the manufacture of cement, and they require relatively simple and inexpensive equipment.

Ammonium Sulfate Process

The third of the three approved projects, that of Columbia Metals Corp., was revived early in December when WPB approved the construction or a $4,000,000, 50-ton-per-day plant at Salem, Oregon, to be built with DPC cash. This plant will use the ammonium sulfate process developed by the Bureau of Mines, Chemical Construction Corp., and Gaither Chemical Works. Clay and ammonium sulfate are roasted together to form alum and ammonia. The alum is leached out of the sinter with water, leaving the insoluble silica, and then purified by recrystallization. This recrystallized alum is then combined with the recovered ammonia to give aluminum hydroxide, which in turn is kiln dried to alumina. It is expected that it will be at least a year before the plant is in operation, and costs are expected to run in the neighborhood of $75-80 per ton of alumina. Disadvantages of the process are the cost of ammonia and, from an emergency value standpoint, the fact that it does not make an intermediate product which could be diverted over into existing Bayer plants if necessary.

In addition to the three processes mentioned, one other, that of Kalunite, Inc., has received official government recognition to the extent of getting money for a plant. In fact Kalunite was actually at the head of the procession, having received the go-ahead from WPB and DPC in the middle of 1942 on a $4,500,000 plant to go up near Salt Lake City, Utah. This plant is just now getting into operation and will eventually make 100 tons per day of alumina from alunite, a high-alumina potash ore. Although known deposits of alunite are estimated at only about 12,000,000 tons, Kalunite believes it will be able to modify its process to work on clays and low grade bauxite.

Kalunite Process

In the Kalunite process, alunite ore, which contains basic alum and potash, is leached with cycle sulfuric acid of about 10 per cent strength, giving potassium alum, which is crystallized. These crystals, when placed in an autoclave at 150 lbs. pressure and 94 deg. C., decompose into basic alum and sulfuric acid again, but this time the basic alum has an alumina content of 33 per cent as compared with 20 per cent originally. The regenerated acid, containing some of the potassium sulfate and about 15 per cent of the alum, is recycled, while the rest of the alum that has crystallized is calcined at 1,000 deg. C. to give alumina and potassium sulfate. The remaining acid (about half of the original) is driven off as SO_3 during the calcination. If the process is used on clays, an outside source of acid is required.

Closely akin to the Kalunite process, although it has not yet received the nod from WPB, is the method developed by Phelps Dodge Corp. for recovery of aluminum and potash from the ore flotation tailings of its huge Morenci copper mine in Arizona. This process, however, uses acid of 80 per cent strength to obtain potassium alum which is then dehydrated and calcined to give alumina, potassium sulfate and sulfur dioxide, the latter going to an acid plant. Make-up acid is made from sulfur dioxide obtained in the copper smelting. Advantages are ready-mined raw material and available SO_2.

Still another process that has received considerable attention is one in which roasted clay is leached with concentrated HCl, separating the alumina and iron from silica as aluminum and ferric chlorides.

Although there is much interest in postwar cost of alumina from clay, little can be said on that subject at present. Some interested parties believe it can be brought to within shooting distance of Alcoa's peacetime costs of $30-33 a ton. One thing seems fairly certain, however: there will be no "most economical" or "best" process. Raw materials and other conditions will vary, as will processes.

CHEMICAL SPECIALTIES

Water Dispersible and Bulking Gums--3

LOCUST BEAN GUM

by CHARLES F. MASON, Consulting Chemist

THE GOOD THICKENING PROPERTIES of locust bean gum, along with its greater purity as compared with gum arabic and karaya, recommend it as a substitute for the more expensive gum tragacanth in certain applications. This is the third and concluding article in the series on gums by Dr. Mason.

LOCUST BEAN GUM, which is known in commerce and the arts by many synonymous terms, enjoys classification with the gums not because it is of similar chemical composition and origin but because it possesses similar physical properties, such as dispersibility in water, and thickening and mild adhesive properties. The true gums, namely karaya and arabic, which have been described in earlier articles, exhibit an acid reaction when dispersed in water and consist largely of organic acids with their salts, but locust bean gum has a neutral reaction under similar conditions and reacts acid only after fermentation has progressed sufficiently.

Its chemical and physical properties indicate that this gum should be classed with the starches, gelatines and cellulose, but because of its source and background it continues to be sold by gum merchants and classified by the trade along with vegetable gums.

The source, which is the carob bean, was known before the Christian Era, and records are available that the gum was used in the year 100 A.D. as a laxative and diuretic. The tree, *hinnaeus ceratonia siliqua*, is indigenous to Spain and Palestine but also grows wild or is cultivated in the entire coastal Mediterranean section. Two synonymous names under which it is sold are swine's bread and Saint John's bread, the latter, as with "locust bean gum," referring to Saint John subsisting upon locusts and wild honey in the desert.

The trees begin to bear fruit when they are about four years of age and about three feet in height; they blossom in late summer or early autumn and then ripen into smooth long pods, which contain about twelve red seeds. The pods are used as a source of cattle food, molasses, syrups, which can be fermented to make wine or hard liquor, and for flavoring tobacco before it is cured. The Germans use the seeds and pods for roasting to make a coffee substitute. Each pod contains about 50 per cent sugar, chiefly glucose and saccharose. They have been used as food in times of scarcity.

Recovery of the Gum from Beans

The pods are gathered and spread out in the sun to dry, after which the seeds are removed either by hand or machine and are packed for shipment. They contain the valuable gum, and removal of it is the subject of many patents, principally in Great Britain, all of which involve the removal of the outside skin and ovarium by passage between rollers which turn in opposite directions. Some patents specify pre-treatment of the seeds with dilute caustic soda solution, followed by washing, before subjecting them to the roller treatment, but the one that has been most successful and widely adopted removes the two outer coatings in the above manner and then introduces the de-hulled seeds or endosperms into a rotary oven which is heated to 150 degrees C.

The temperature is regulated carefully and the seeds are subjected to a rolling action which exposes all sides to the same temperature conditions. The operation is completed when they have attained a golden brown color. These partially de-hulled, roasted seeds or endosperms are then introduced into twenty times their weight of boiling water, and after two hours, during which the temperature is kept at the boiling point, the source of heat is removed and the contents are allowed to cool slowly for four hours but not longer.

The cooked liquor, which contains the dispersed gum and traces of crude fiber, is pumped through bronze screens and then through bag filters until it is transparent, after which it is subjected to evaporation by indirect heat for removal of the excess water. When the moisture content approaches about 25 per cent, the pasty solid is spread out upon trays, which move slowly through a countercurrent hot air drier and when the correct degree of brittleness is attained, the gum is pulverized and packed for shipment. The gum is usually sold either in powder form or in the form of 4 per cent water dispersion or jellies.

Substitute for Tragacanth

It is obvious that this expensive treatment far exceeds that which gum arabic and karaya receive, and the price of the gum to the consumer is higher in proportion. This greater purity combined with the good thickening properties is why locust bean gum is suggested as a substitute for the very expensive gum tragacanth. Locust bean gum comes to the consumer in a cleaner form than arabic and karaya, thereby relieving him of the burden of filtering dispersions or mucilages to remove objectionable foreign matter.

The properties of locust bean gum are listed in Table I along with those of arabic and karaya to permit comparison, but it should be already obvious that differences are many and similarities are few.

Table I—Properties of Locust Bean Gum

	Ceratoniae Gummi, or Locust Bean Gum	*Karaya*	*Arabic*
Moisture	12.08%	11.60—15.31%	12.00%
Ash	2.78%	6.07—6.96%	2.30%
Materials in ash			Ca and Mg
Solubility in water	Complete		0.98% insol.
Reaction	Neutral	Acid	Acid
Preservative	Phenol and derivatives	Alkalies	Alkalies
Nitrogen	0.38%		1.51%
Oil	1.80%		
Fehlings Soln.	No reduction		
Solvents required	None other than water	60% alcohol	30% alcohol

The first three constituents are carbohydrates, each of which have separate and distinct physical and chemical properties,

Table II—Composition of Locust Bean Gum

Galactan	29.18%
Mannan	58.42%
Pentosans	2.75%
Nitrogen	0.83%
Cellular tissue	3.64%
Mineral (ash)	0.82%
Enzyme	

all of which are plentiful from less expensive sources but when combined with the other constituents in this proportion have gummy properties, and the gum is used for this and its thickening effect. This is suggestive of the derivatives which might be prepared from locust bean gum to impart to it more desirable and usable properties.

Table III—Properties of Aqueous Dispersions of Locust Bean Gum and Effect of Various Additives on Such Dispersions

Adhesion	Poor
Water dispersibility	4% solids content usable (not too thick)
Water dispersibility of acetate derivative	12-15% solids
Lead Acetate, basic	White precipitate
Fehling's solution	No reduction, blue precipitate
Mineral acids	Decrease viscosity
Boric acid	Increases viscosity
Borax	Increases viscosity
Caustic alkalies	Increase viscosity
Alcohol	White flocculent precipitate
Tannin	Increases viscosity, then a ppt., dissolves upon heating

Some Chemical Derivatives

It was mentioned in the earlier articles on gum arabic and karaya that possibly useful derivatives of these gums might now be available if they had received more attention from research chemists. Locust bean gum has received some attention in this respect.. Derivatives are the subject of two patents which were issued abroad. One is the treatment of the meal with alkylene oxides after it has been made into a paste with water and rendered alkaline. Ethylene oxide in the vapor phase is specified. After this treatment the paste is heated with stirring for a definite space of time, then neutralized and dried to a solid under reduced pressure.

Naturally this process requires expensive equipment, even for the treatment with ethylene oxide alone. This oxide is a volatile liquid which at atmospheric pressure boils at about 14 degrees C. and would best be applied in the vapor phase for intimate contact with the gum and also for economy. The claim is made that this treatment reduces the viscosity of the aqueous dispersions to such a degree that workable ones of high solids content can be made for dressing and sizing agents. This process may be in operation to-day, and the product may be for sale under some trade name, but if so it has not come to the writer's attention.

Perhaps the interest aroused by issuance of the above patent led other investigators to attempt the formation of derivatives with simpler equipment because it is common knowledge among workers and users of this gum that treatment of the dry powder in a pebble mill or rotary mill with acetic acid and acetic anhydride simultaneously, followed by neutralization with alkalies, transforms the gum into a modified form from which dispersions in water up to 15 per cent can be made without having unworkable jellies.

Uses of Locust Bean Gum

The fact that locust bean gum dries upon evaporation of the water to a smooth, fairly durable film induced many to adopt it as a size and finish for textiles to protect the threads against abrasions as they passed through machines for spinning, weaving, etc. One inventor attempted to improve upon it and was granted a patent here and abroad upon the claim that the film was rendered tougher and that the dispersion was preserved by adding a derivative of naphthalene. He specified alkylized naphthalene sulphacid, which could be added either to the water before making a dispersion or to the ground powder, and after boiling and stirring until a smooth mucilage was obtained the product was ready for use as a size or finisher. To one hundred pounds of gum he suggested five to twelve pounds of powdered reagent, which seems high in proportion. He also claimed that the adhesion, which normally is not of a high order, was improved.

The following are the more common uses of locust bean gum:

1. Thickening agent for general use.
2. Tanning operations (Cutiloid, trade name of a dispersion).
3. Sizing and finishing yarns.
4. Color paste vehicle in calico printing.
5. Creaming rubber latex.
6. Thickener and emulsifier in sauces, salad dressings, ice cream.

For one who has had experience with gums in general nothing need be said about item number one, but item number two is interesting. The claim has been made that the addition of colloids to tanning solutions aided the penetration to such a degree that the operation was lessened from months to a few days and the leather had increased weight and better water resistance. One of the colloids was locust bean gum.

Item number five is another use illustrating some of the remarkable results which are being attained in colloid research. Rubber latex being the sap from rubber trees is preserved in the liquid form by addition of ammonia and formaldehyde, either alone or in combination. The task of concentrating liquid latex in the Far East by evaporation of the excess water before shipment to foreign countries for use in impregnating is expensive, and methods of creaming it were eagerly sought. Creaming means a partial coagulation of the rubber and protective colloids in an upper layer which can be removed from the lower layer of serum, this lower layer being useless. It resembles curdling of milk upon souring, which we attribute to the formation of lactic acid but which can be hastened by the addition of harmless colloids beforehand.

A concentration of locust bean gum in the minute amount of 0.17 grams in 100 grams of water, when added to the preserved latex and stirred with the aid of a colloid mill will cause creaming of the latex. Essentially what takes place is a destabilization and agglomeration of normally stable negatively charged and hydrated protein protected rubber particles. The creamed layer can be removed and shipped as a concentrated rubber latex without evaporation of the water.

Being an irreversible colloid when dispersed in water, this gum is very sensitive to heavy metal salts, which in concentrated solution cause coagulation and precipitation. This may be avoided, however, by adding other irreversible colloids such as glucose and glycerol. As indicated in Table III, mineral acids and oxidizing agents lessen the viscosity of the dispersions while alkalies increase this property; however, alkalies and alkaline salts often result in a darkening of the product.

In closing the writer wishes to emphasize the lack of physico-chemical data which is so apparent in the literature on this product of nature. Information available is rambling and unrelated; viscosity as a function of concentration is totally lacking in published reports, and one unfamiliar with this gum who wishes to use it for a certain purpose must be careful. The only safe guide is to avoid making water dispersions of the untreated gum which have more than four per cent total solids, and when making a less-than-4% dispersion to use heat and stirring in the presence of a preservative.

In case salts of heavy metals or mineral acids are to be added later or the dispersion is to be added to another product, the composition of that product should be known or interfering compounds may be present and precipitation will result. For one who is interested in using this gum there are a few guiding lights in the information submitted above, but they are admittedly very inadequate. However, in spite of this condition, locust bean gum, although of limited availability now as a result of war conditions in the Mediterranean, may be the raw material necessary for improvement of products and processes which await postwar development.

Precautions in the Use of Chlorinated Naphthalenes and Diphenyls

by LEONARD GREENBURG, Executive Director
Division of Industrial Hygiene, New York State Department of Labor

BASED ON A GENERAL STUDY of the whole problem and especially on experience gained from two recent outbreaks of dermatitis and liver damage in cable plants using these materials, the New York State Department of Labor offers some specific recommendations for safe practice in working with chlorinated naphthalenes and diphenyls. The following is a digest of a report by Dr. Greenburg which appeared in full in the October 1943 issue of "The Industrial Bulletin," published by the Division of Industrial Hygiene at Albany.

THE CHLORINATED naphthalenes comprise a group of chemical substances made by the addition of various amounts of chlorine to a naphthalene base. The amount of chlorine may vary from three to six or possibly more atoms, providing compounds from trichlornaphthalene to hexachlornaphthalene.

In the same manner, the varying amounts of chlorine are added to a diphenyl base providing a group of compounds of varying chlorine content.

As a rule, the final substances, as used in industry, are mixtures of differing chlorinated naphthalenes. Earlier, these were, as a rule, possessed of a lower degree of chlorination, and later on the compounds were usually of a higher degree of chlorination with varying amounts of chlorinated diphenyls added.

These substances are not new. Perchlornaphthalene was used in Germany during the last war. These groups of compounds are manufactured by approximately five companies in the United States and they are sold under varying trade names by the manufacturers.

The chlorinated naphthalenes and diphenyls are valuable industrial products. Briefly, their properties are as follows:

1. Resistance to water and alkali.
2. High insulating value and dielectric constant.
3. Thermo plasticity.
4. Quite stable chemically.
5. Flame resistant.

For these reasons, they are of value in the making of electric condensers and in the insulation of wire and cable.

Experience in Industry

The chlorinated naphthalenes and diphenyls are applied in industry by two methods.

1. A cold method in which the material is dissolved in a solvent usually a mixture of petroleum naphtha and toluene and,
2. A hot method wherein the material is rendered plastic by heat.

During the past year the Division of Industrial Hygiene of the New York State Department of Labor has conducted an investigation in two cable plants using chlorinated naphthalenes and diphenyls. In this investigation, many cases of dermatitis were found, and several deaths due to liver damage among workers in the industry.

The examination of workers in the two factories showed relatively few cases of enlarged liver—five in all, on palpation.

Comparison in these two plants showed a very much higher incidence of acneform dermatitis in one of the plants as compared with the other; namely 21 per cent as compared with 60 per cent, the former being in the cold process establishment and the latter being in the establishment employing the hot process only. The dermatitis appeared to take place on the average in about seven and one-half months in the hot process plant as compared with 10 months in the cold process plant.

Conclusions

As a result of our general re-study of this whole problem and our experience in two recent outbreaks, as well as several isolated experiences we are able to draw several basic conclusions:

1. Chlorinated naphthalenes and diphenyls are in general highly toxic compounds and must be used with extreme care. Industrial hygienists should make every effort to see that such exposures are controlled, insofar as humanly possible. In this effort, we do not believe it safe to rely on limiting atmospheric concentrations but rather to depend on a maximum of maintenance and engineering control.

2. Toxic exposures may be more readily controlled where the cold or solvent method of impregnating cable is employed than where the hot process is used.

3. Of the known cases of liver disease in our experience, the available history and experience generally points to exposure to vapors or fumes from the hot process. There is no clear evidence in our experience although it is possible that skin absorption may produce systemic poisoning. Physiologically we see no reason why this is not possible. However, most dermatitis cases do not develop liver damage.

And finally, I should like to call attention to a group of recommendations which were agreed upon by all of the groups involved in the last outbreaks of poisoning as being of utmost importance in the control of this hazard.

Recommendations

1. Unless there is a very good reason for using the hot method of impregnation, all new installations should use the cold or solvent method of impregnation with chlorinated naphthalenes and diphenyls. Where the hot method is now being used it should be changed over to cold, if possible, or surrounded with every known protective measure.

2. General hygienic measures should be followed but in no case should these be allowed to supersede engineering control of the primary source of the exposure, the operations in the plant.

The following hygienic measures may be considered good practice where these compounds are handled.

a—Two lockers for each worker exposed to chlorinated waxes (one for working and one for street clothes).

b—All work clothes above the underwear should be provided and laundered at least twice a week by the management.

c—The workers should change to clean underwear at the end of each shift before getting into their street clothes.

d—Supervised cleaning.

1—At noon the workers should remove clothing and scrub hands and face under supervision.

2—At the end of the shift they should be required to take a supervised shower before changing back to street clothes.

e—Protective skin creams or protective clothing should be provided by the management at the discretion of the foreman, nurse, medical, or plant superintendent.

f—All departments handling chlorinated synthetic waxes should be thoroughly cleaned according to a prearranged schedule. This should include the removal of all deposits of waxy material from the machines, floors and surrounding objects. Workers doing the

cleaning should be provided with protective clothing and supplied air or organic vapor masks where exhaust ventilation is inadequate or not possible.

3. The foremen of all departments where this material is handled should be apprised of the toxic nature of the material and instructed in safe handling procedures. These men should make it their duty to check up on the workers in their departments and instruct them in safe practice.

4. Preemployment and periodic physical examinations should be made of all exposed workers. These should include the taking of a full clinical history with special emphasis on gastro-intestinal disturbances and dermatitis. In addition, the skin should be carefully examined periodically and the more reliable liver function tests performed. Gastro-intestinal complaints developing in a worker at any time should be a signal for an immediate medical check-up. A history of liver disease, jaundice, or antisyphilitic treatment should automatically exclude a worker from jobs involving a possible toxic exposure. Pregnant women should not be employed where there is a possible exposure to the synthetic chlorinated waxes.

New Castor Derivatives Make Multi-Purpose Insecticide

CHEMURGY is giving increased impetus to the development of insecticides of domestic vegetable origin to supplant imported materials such as rotenone and pyrethrum that are now scarce or unavailable.

One of the more recent of these is a product made from the castor plant. Using extractives from the castor leaves and other portions of the plant, Woburn Chemical Corp. is now in quantity production on its insecticide, Spra Kast, which it claims will control a large majority of the insects that eat up our food crops. The insecticide is made in two types, 2-C for use on citrus fruits and 2-A for vegetables.

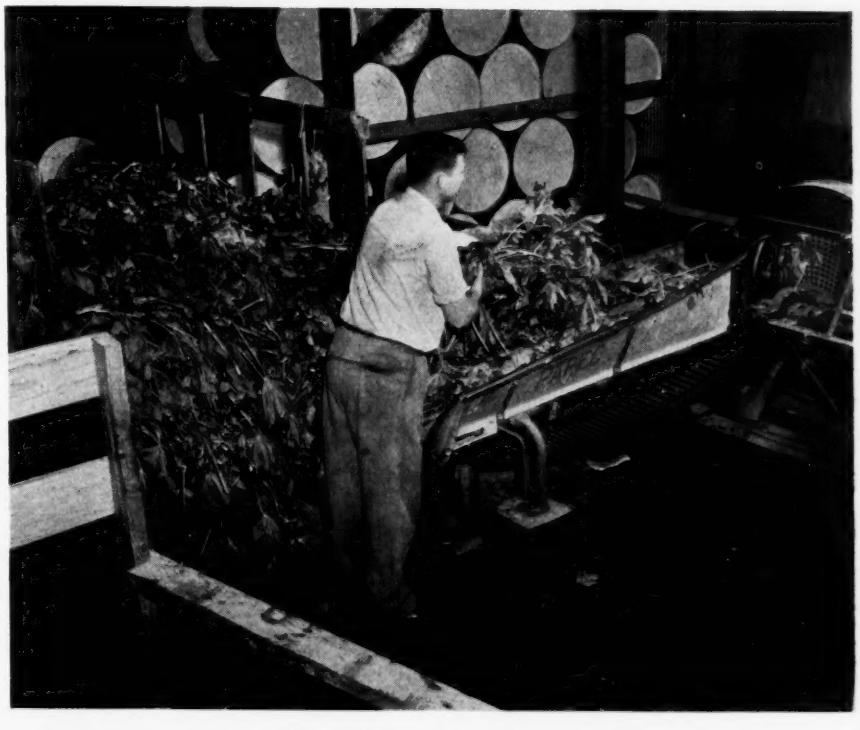
Type 2-A provides quick kill in addition to prolonged effectiveness, although on vegetables it is not necessary to provide the same degree of prolonged effectiveness because of the more frequent sprayings required to cover the continuous new growth. In combination with sulfur or copper, it has been used in commercial applications for the control of red spider, purple mite, six-spotted mite, rust mite, melanose and many soft-bodied worms infest vegetables. Particularly effective results have been obtained on net nacrosis on potatoes when in combination with neutral copper.

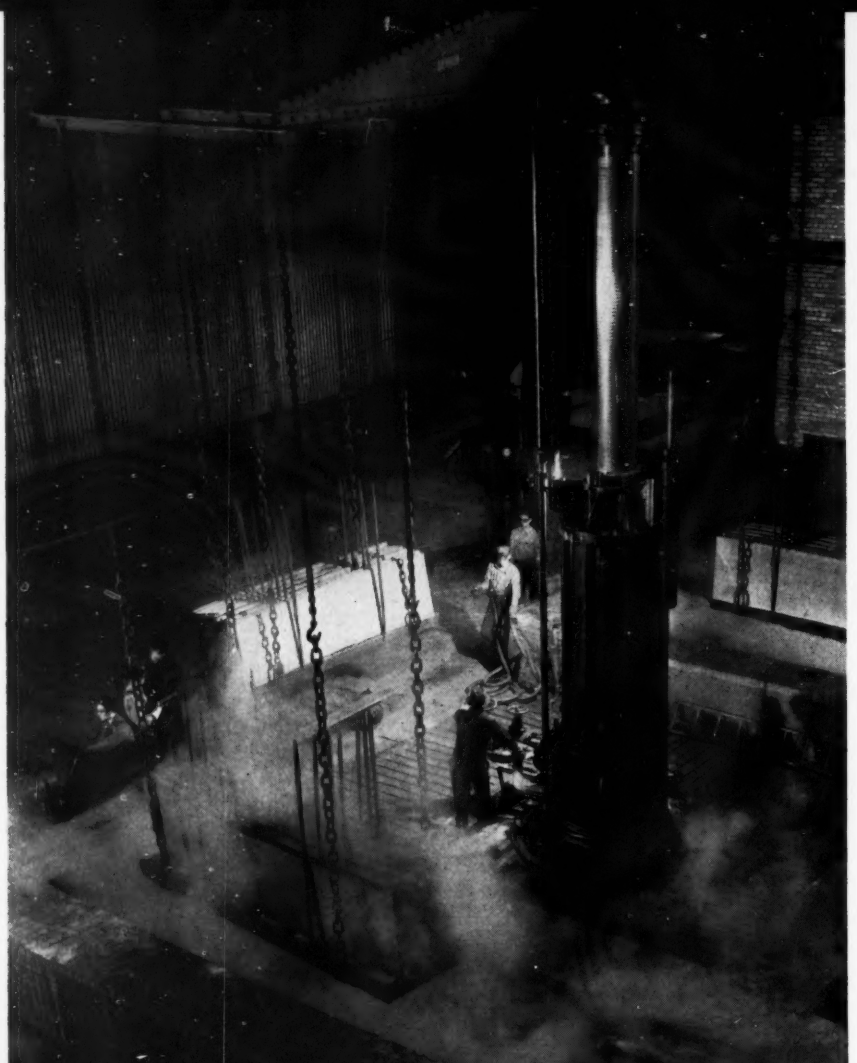
The castor extractives will not kill all insects. In some cases they act as a repellent, in other cases as a contact poison on sucking insects such as aphids, thrips, lice, mealy bugs, leafhoppers, and red bugs; they control chewing insects such as beetles, leaf rollers and caterpillars. The insects infesting beans, beets, cabbage, cucumbers, potatoes, spinach, tomatoes, melons, squash, lettuce, and peas have been reported controlled by the insecticide.

It has been somewhat difficult to determine chemically the exact nature of these castor extractives. Chemical literature does not provide laboratory techniques for such determinations. However, some interesting collateral benefits have been obtained from the use of these materials in insecticides. Which of the component parts produces this result is not known, but it was noticeable first in the orange groves of Florida, and later, on vegetables and fruit trees, that plants on which this spray has been used appear to be more vigorous and healthy than those on which some other insecticides have been used. Furthermore, it seems to accelerate the maturity of the crops. That may be due to enzymes from the plant, although it has not been proved. It is known, however, that the castor plants generate more enzymes than are needed for their own sustenance and growth and that this surplus of enzymes might be the explanation for the stimulation of growth, the healthy condition, and the acceleration of maturity in the crops on which castor insecticides are sprayed. Chlorophyl, which is another of the component parts of the spray, might add to these beneficial effects.

The Woburn Chemical Corp. has recently opened a new plant in Maryland for the production of castor insecticides. However, several factors prevent the development of this industry to meet all market requirements at the present time. The demands for castor oil in war production and the shipping difficulties encountered in bringing in the crops from Brazil and Mexico curtail the supply of available raw materials. The Commodity Credit Corporation has limited considerably the acreage of the castor bean crop in this country in its apportioning land area of crops to favor the edible grains which are of primary importance in the nation's wartime food problems. The curbing of supply results likewise from State Department adherence to provisions of the Reciprocal Trade Agreements, an important part of our good neighbor foreign policy, by which it attempts to keep the production of castor beans in the hands of South and Central American producers. However, the fact that the castor leaves cannot be shipped great distances in their natural state, since they begin to decompose very quickly after they are harvested, argues for a future crop production in this country sufficient to supply the leaves necessary for insecticide.

Castor leaves being fed to chopper in first step in recovery of derivatives





Spent steel pickling solutions, usually discarded, are an economical raw material for manufacture of ferrous sulfate.

Manufacture of FERROUS SULFATE

by ANDREW TREFFLER, Cadillac Oil Co., Detroit, Mich.

TEMPORARY SCARCITIES and higher prices of materials used as coagulants in water purification have given rise to renewed interest in ferrous sulfate for this purpose because of its low cost and relatively simple manufacture. Work conducted on the Ohio River below Pittsburgh, on the Lake Mead water supply serving the metropolitan district of southern California, and in France, has shown ferrous sulfate to compare favorably with copper sulfate, alum, aluminum chloride and calcium chloride for coagulation under certain conditions. Calcium oxide or soda ash are sometimes used in conjunction with it to speed up flocculation.

Crude ferrous sulfate, or "copperas" as it is known in the trade, is a byproduct of ore and metal processing. It is sold in crystalline form, either as a fine powder known as sugar copperas, or in lumps consisting of agglomerates of large crystals. The color of the product varies from a light blue to green, and if it is exposed to moist air for a sufficient length of time it gradually turns to a rusty brown.

Pure ferrous sulfate, $FeSO_4.7H_2O$, molecular weight 278, contains 20.1% ferrous iron, 34.5% sulfate radical, and 45.5% water of crystallization. It is formed by dissolving iron in sulfuric acid at a temperature of 170-180 deg. F. with evolution of hydrogen and hydrogen sulfide.

The reaction is exothermic, generating a heat of 20.85 kilogram calories per mol of sulfate, but it is not self starting. Initial heating from an external source is required up to a temperature of 170 deg. F. at which point the action becomes spontaneous and will continue until all of the iron is used up or until the concentration of acid drops to 3%. The reaction is usually carried out in a lead-lined vessel fitted with a lead steam coil or sparger for preheating.

Ferrous sulfate can be prepared commercially from any of the following sources:

(1) Concentrated steel pickling solutions (about 28° Bé) which are free from chlorides and hydrochloric acid and have a low manganese content. Such solutions can easily be concentrated to the required Baumé by applying heat and adding an excess of iron scrap and concentrated sulfuric acid.

(2) Sugar copperas obtained in the processing of titanium ores, generally contaminated with traces of titanium. If the titanium content of such copperas is too high, it can be removed by settling it out of a 28° Bé. solution.

(3) Iron scrap with a low manganese, carbon and silicon content. The manganese content of such metal should not be higher than 0.5% if the manganese in the ferrous sulfate crystals is to be kept below 0.025%. Carbon and silicon can be filtered off, provided there is not too much of them as in cast iron, in which case the filtering process is too tedious and expensive. By dissolving 5-gram samples of the metal in 10% sulfuric acid and comparing the carbon, silicon and graphite settlings with a control sample, the amounts of each can be quickly and easily estimated.

A very simple method of obtaining the ferrous sulfate crystals consists of concentrating a 28° Bé. copperas solution up to 41° Bé. by heating to 180 deg. F. and adding an excess of iron scrap and concentrated sulfuric acid. The concentrated liquor is transferred into a lead-lined insulated settling tank and the carbon, silicon, and graphite allowed to settle over night. The almost clear liquor is then drawn off through a side outlet, one or two feet above the bottom of the tank, and run through a rubber hose and glass cloth filter bag into a crystallizer.

The crystallizer may consist of a lead-lined or rubber-lined tank filled with hardwood poles about six inches apart suspended from a wooden frame set across the top of the tank. The filtered liquor, having an original temperature of about 160 deg. F., cools down to room temperature in two or three days and forms

crystals on the poles and on the sides and bottom of the tank. In so doing it loses from 12 to 14 Bé. degrees concentration. Further chilling, either by artificial means or by utilization of low outdoor temperatures in cold climates, decreases the concentration further and increases the yield of crystals. Slow cooling results in the formation of medium sized and large crystals, quick cooling and agitation in the formation of small crystals.

Although the process of producing ferrous sulfate crystals is quite simple, difficulties are encountered in preventing their oxidation by air, whereby ferrous sulfate is changed into ferric sulfate. A solution of ferrous sulfate kept in the open for two months will be completely oxidized. A high amount of metallic or organic impurities, and especially heat, accelerates this reaction in the liquor as well as in the wet crystals. Heating the liquor without keeping up the reducing action of sulfuric acid and iron also promotes oxidation, as does storing the wet crystals for more than a day. Moist air can be regarded as the main factor in the oxidation of the dried crystals. Storing of the crystals in airtight containers is therefore essential.

Pure ferrous sulfate crystals and solution have almost a sky blue color. Oxidation progressively changes this to green and then to rust brown. The best purifier and preserver of the crystals known is ethyl alcohol. It not only dissolves ferric sulfate and ferric chloride, but it also removes excess moisture, the promoter of oxidation. As the use of ethyl alcohol makes the manufacture quite expensive, however, manufacturers have been looking for cheaper means of preventing or retarding the oxidation. The most satisfactory alternate method is by use of sulfuric acid. The presence of 1% of free sulfuric acid in the liquor cuts oxidation to a minimum. On crystallization, such an amount leaves in the crystals less than 0.05% free sulfuric acid, sufficient to take up any traces of free moisture in the crystals which otherwise might start the oxidation. In addition to this precaution it is recommended that a few small pieces of iron be hung in the liquor in the settling tank to provide a slight reaction with the free sulfuric acid and thus counteract any oxidation on the surface of the solution.

The wet crystals as they come from the crystallizer are drained on wooden floors. If washing is necessary they can be treated with the mother liquor from which they were crystallized. After breaking and sizing, the crystals are dried in a rotary drier at a temperature of about 140 deg. F. Overheating should be avoided, as ferrous sulfate with seven molecules of water of crystallization easily loses two of them to form apple green crystals containing only five molecules of water.

A ferrous sulfate solution—such as a pickling solution— of a concentration not greater than 28° Bé. and containing no free sulfuric acid can be stored in either iron tanks or lead lined tanks. Some amount of storage is desirable, since it permits pre-settling of a large portion of the impurities.

Pickling solutions generally yield fairly good crystals if they do not contain any chlorinated emulsifying agents or chlorides. Chlorinated dispersing agents can easily be substituted by chlorine-free emulsifiers, of which there are a number on the market. In concentrating the solution later on with sulfuric acid and iron, the chlorine-free emulsifier will be decomposed by hydrogenation and so will not interfere with crystallization.

Finally, to control the process, the writer recommends the following quick and simple analytical methods:

Determination of free moisture in crystals: Weigh out about three grams of the crystals on a watch glass and dry them in an electric oven at 100 deg. C. to constant weight. At this temperature ferrous sulfate loses six molecules of water plus any excess moisture that is embedded in the crystal structure in the case of complex crystals. It will be found that small or crushed crystals lose less weight on drying than do large crystals or lumps.

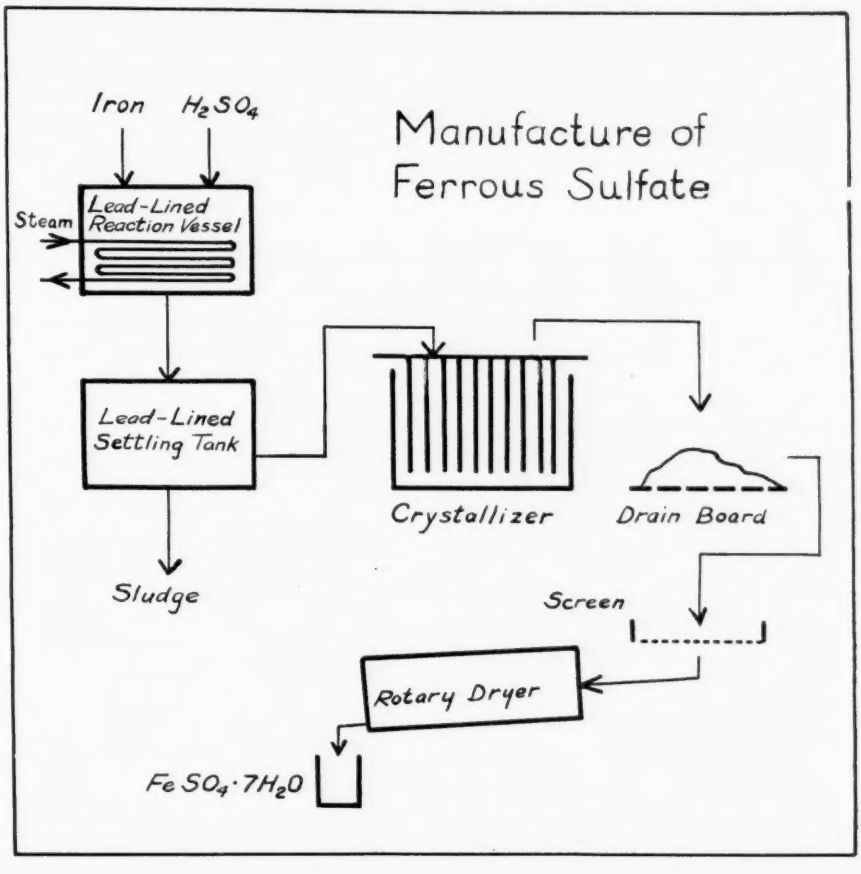
Calculation of moisture: Original weight —(weight of dried crystals x 1.604) = free moisture.

Determination of ferric sulfate in ferrous sulfate: Take two 4-ounce oil bottles and calibrate them to 100 cc. Add to each one: 10 cc. normal ammonium thiosulfate solution and 10 cc. 50% sulfuric acid; fill to the 100 cc. mark with distilled water. Now add to the first bottle, by means of a calibrated 1 cc. pipette, 1 gram of the ferrous sulfate solution and shake until the red brown color fully develops. Then to the second bottle add gradually, by means of the calibrated 1 cc. pipette, ferric sulfate solution of which 1 cc. equals 0.005 gm. of ferric sulfate, until the color shade of the first solution has been matched.

Calculation of ferric sulfate: X cc. titration x 0.005 x 100 = % ferric sulfate. The standard ferric sulfate solution is made up by dissolving 0.856 gm. ferric ammonium sulfate in 100 cc. distilled water.

Determination of free sulfuric acid in ferrous sulfate: Weigh out 100 cc. of the ferrous sulfate solution in an Erlenmeyer flask and dilute with 100 cc. distilled water. Add a few drops of methyl orange and titrate with 0.1 normal NaOH solution until the pink color has changed to yellow. A yellow precipitate indicates that the endpoint has been passed.

Calculation of free sulfuric acid: $\frac{\text{X cc. titration} \times 0.0049 \times 100}{\text{weight of the 10 cc. of soln.}}$ = % free H_2SO_4.



BETWEEN THE LINES

Increasing Naval Stores Output Through Chemical Stimulation

With naval stores production falling short of goals set in 1943 *and probable requirements in* 1944, *producers and government are accelerating experimental work on stimulation of yields from the trees by chemical means. The two most promising methods consist of application of* 40 *per cent sulfuric acid or* 25 *per cent caustic soda solution to the gashes in the bark. The outlook is regarded as promising for obtaining between* 50 *and* 100 *per cent increase in turpentine and rosin production by these methods.*

NAVAL STORES producers this past year have failed by a large margin to meet wartime production goals. Requirements for 1942-43 were set at 78,000,000 pounds of rosin and 2,250,000 gallons of turpentine. Producers fell very short of this goal; when it became evident early in the season that they would, the figures were scaled down, and they still failed.

Meanwhile, wartime requirements led the Department of Agriculture to call for even greater production for 1943-44, amounting to 350,000 barrels of gum turpentine and 1,150,000, barrels of gum rosin. In the face of difficulties such as reduced manpower, that led to the failure to attain production levels asked last season, there is the obvious outlook that the coming year will see another short production report, as measured by estimated needs.

New and increased requirements of both American and associated nations' forces and industries have emphasized the importance of this situation. Turpentine and rosin are needed in production of munitions, flame-throwers, flares, as substitutes for camphor and coconut oil formerly obtained from the Philippines and Formosa, in the manufacture of synthetic resins, manufacture of paper for building and packaging, for use as a paint thinner, as core binders in making metal castings for ships and tanks, and as fatty acids for soap-making. All probable production of naval stores in the coming months will be short of enough to meet the demand for fatty acids alone, according to the recent outlook.

Under Army specifications, artillery shells are coated with wax and rosin; the Army likewise specifies rosin in aircraft varnishes. Under lend-lease, vast quantities have been shipped abroad. Naval stores furnish acceptable substitutes in some instances for linseed oil and shellac.

1944 Outlook Pessimistic

The increased demand is established, but many naval stores operators are reported to be pessimistic about meeting the high figures for 1943-44 in the face of materials and labor shortages. For this reason, the probability of increasing turpentine and rosin production through artificial stimulation of the producing trees is gaining in the industry. Earlier experiments are being amplified, and reports just received from the producing areas confirm these promising prospects.

Some experimental work had been done by the Forest Service, and in the recently-passed supplemental National Defense appropriations, the Agriculture Department had sought funds to continue its work in this field. Both House and Senate eliminated the increase provided in the bill, however, and it now appears that the work will be continued only on the reduced appropriations available in the past, and contained in the bill as it passed.

The plan of stimulating production is based on research which has shown that the yield per tree can be stepped up by applying small amounts of sulfuric acid or caustic soda to the freshly chipped streak on the tree. In passing, it is believed that not only does this not harm the tree, but actually leaves it available for use as a pole or piling log when turpentine production is exhausted.

Instead of deeply scarifying the tree as usual methods require, it is possible merely to scratch through the bark, and the lessened depth of chipping involved thus preserves the tree for logging. The producer therefore stands to realize a double return, the turpentine and later the timber value of his trees.

Earlier tests indicated that production could be augmented at least 17 percent by chemical stimulus. Current experimental work however has greatly enhanced this prospect. New methods of chipping and chemical application have given increased yields up to 125 percent over normal.

Further Experimental Plans

It has been planned to intensify these experiments, as many as 500 operators having been scheduled to try this method of increasing the output of their trees this year. A number of them in south Georgia, central Florida, Mississippi and other producing areas, are so engaged, as it is. Field agents of the Forest Service are working with them to insure best results. It is hoped that a number of operators can install pilot plants to complete the field experimental operations.

Forest Service representatives who have just returned from the area of some of these operations are very encouraged. One operator in Mississippi reported attaining a 50 percent increase in production; another 25 percent. The average has been 17 to 20 percent, but these increases are viewed by the Forest Service as a mere beginning. The outlook is regarded as very promising for striking an average of 50 to 100 percent increase, based on the latest reports.

Partially developed methods having shown promise of increasing turpentine and rosin output 30 to 40 percent, the Forest Service reports that other methods not yet beyond the test tube stage already have shown up to 125 percent increase is possible, as proven in one smaller plant.

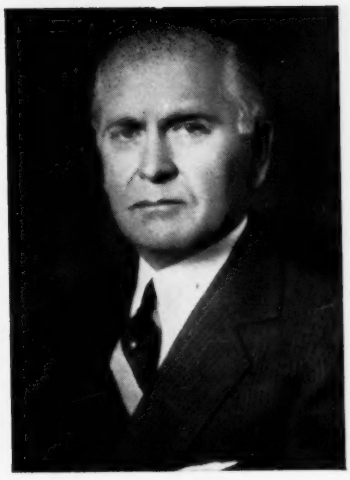
There are a number of problems involved on which much work has to be done. Some care has to be exercised at this stage to determine if the resulting product is free of undesirable characteristics. The right acid formula and the right chipping technique are still matters for study.

One handicap reported is the need of a suitable applicator. It also is necessary to insure some uniformity in field tests to determine what can be done. Experiments under way or contemplated include additional tests with phloem chipping plus application of chemicals; additional study, as a guide to the most efficient chipping practices of the comparative rate and pattern of gum flow from chemically treated and untreated streaks; completion of tests with additional chemicals; commercial tests of chemical stimulation in stands of varying composition (slash and longleaf pine) to permit an accurate gauge of costs and yields

The phloem chipping plus chemical application tests have been reported as very promising; so have those with additional chemicals. An important feature of the

(*Turn to page 137*)

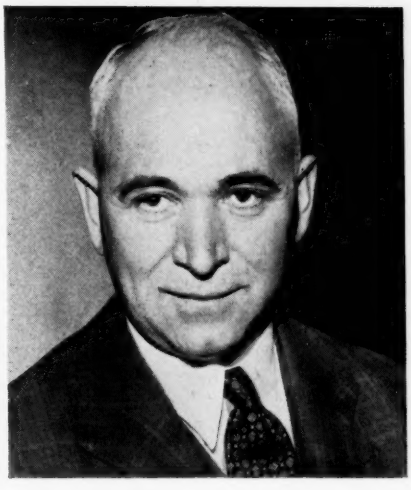
Headliners in The News



G. W. DOLAN has been elected president of The Mathieson Alkali Works (Inc.) upon the retirement of E. M. Allen on January 1. Mr. Dolan joined the Mathieson organization in 1930; has held various positions of responsibility and in 1941 was elected executive vice-president of the company. Mr. Allen was president of the company since 1919 and also chairman of the board since 1938. He will continue as chairman of the board.

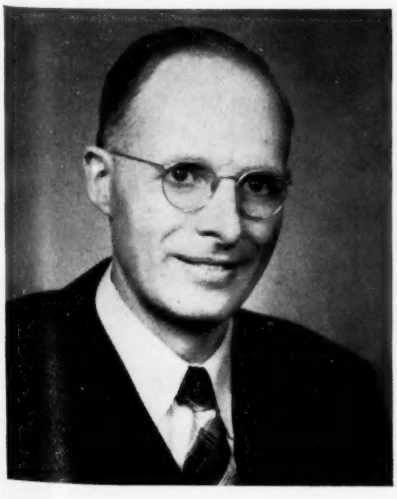
DR. CARL S. MARVEL, professor of organic chemistry in the University of Illinois, has been elected president of the American Chemical Society for 1945. Dr. Marvel took office on January 1, when Dr. Thomas Midgley, Jr., became president.

LAWRENCE H. FLETT has been named Director of the New Products Division of the National Aniline Division of Allied Chemical & Dye Corp. Mr. Flett has transferred his office from the Buffalo plant to the company's executive offices in New York City.



EDWARD HATHAWAY was recently appointed purchasing agent of Monsanto's Merrimac Division plant at Everett, Mass., and its subsidiary, the New England Alcohol Co. as of December 1, coincidental with the retirement of Everett E. Brainard.

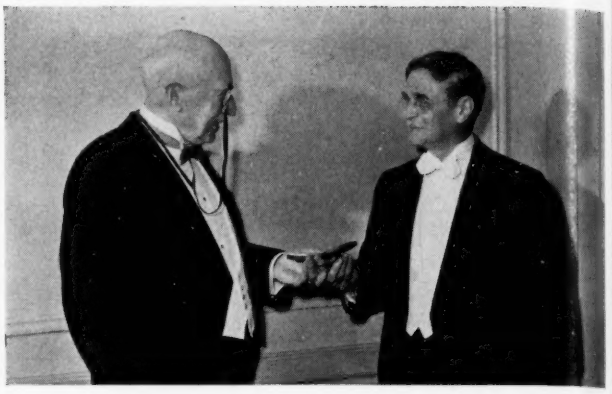
HUGH R. STILES has been named manager of a newly formed Agricultural Division of the Commercial Solvents Corp. Sales Department. His office, at Terre Haute, Ind., will handle the expanding business of the company in the agricultural field, particularly in vitamin feeds and insecticides.



W. S. RICHARDSON, general manager of the chemicals division of the B. F. Goodrich Co., has been elected vice-president of Hycar Chemical Co. He succeeds R. W. Albright, who recently resigned to become president and general manager of Distillation Products, Inc., at Rochester, N. Y.

RAYMOND DIAZ, formerly treasurer of the Benner Chemical Company, Chicago, Ill., joined the Diamond organization as of January 1st as Superintendent of District Offices of the Diamond Alkali Sales Corporation, according to a recent announcement by the company.

Du Bois Receives Perkin Medal



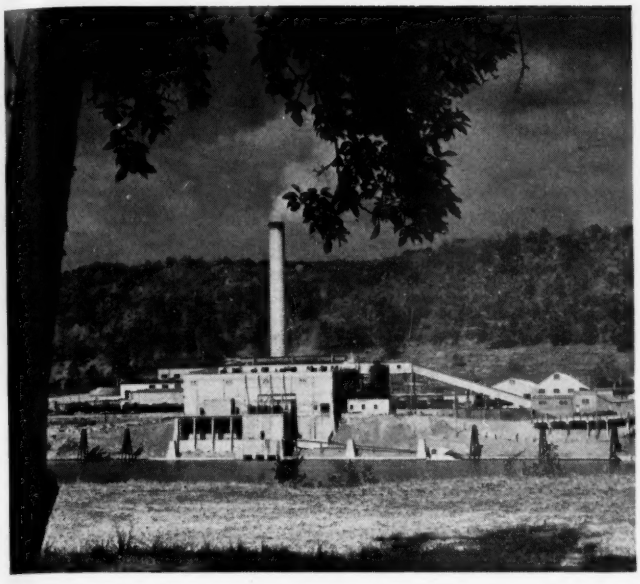
The American section of the Society of Chemical Industry, the New York Section of the American Chemical Society, the American Institute of Chemical Engineers, and the Societie de Chimie Industrielle met jointly in New York on January 7th to award the Perkin Medal to Gaston F. DuBois, vice-president of Monsanto Chemical Co., for outstanding work in the chemical profession. At the right: Dr. Marston T. Bogert of Columbia University presents the Medal to Mr. DuBois.

Below, left to right: Foster D. Snell, chairman of the American section of the S.C.I., presided at the meeting; Frank J. Curtis, vice-president of Monsanto, who spoke on the personal side of the medalist's life; Dr. Charles A. Thomas, Central Research Director of Monsanto, who reviewed the accomplishments of Mr. DuBois; Wallace P. Cohoe, president of the Society of Chemical Industry; and Charles Belknap, president of Monsanto Chemical Co. For a report of Mr. DuBois' talk see page 104.

Frolich Honored By North Jersey Section

A testimonial dinner to Dr. Per K. Frolich, retiring president of the American Chemical Society, was held by the North Jersey section of the society in Newark, N. J., January 10th. In recognition and appreciation of Dr. Frolich's outstanding service to the society he was awarded a specially designed pin by the local section. At the right; H. E. Riley, chairman-elect of the section, presents the pin to Dr. Frolich.

Below, left to right: Dr. E. R. Allen, chairman of the section, who presided at the meeting; F. A. Howard, president of the Standard Oil Development Co., who discussed the growth of that organization and its contribution to chemical technology; Walter J. Murphy, editor of Industrial and Engineering Chemistry, who addressed the meeting on, "Merchandising Chemicals"; and Dr. Vincent DeVigneaud, chairman of the New York Section of the American Chemical Society.

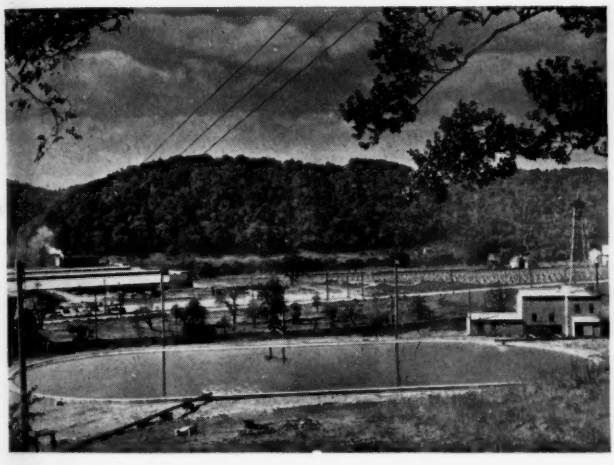


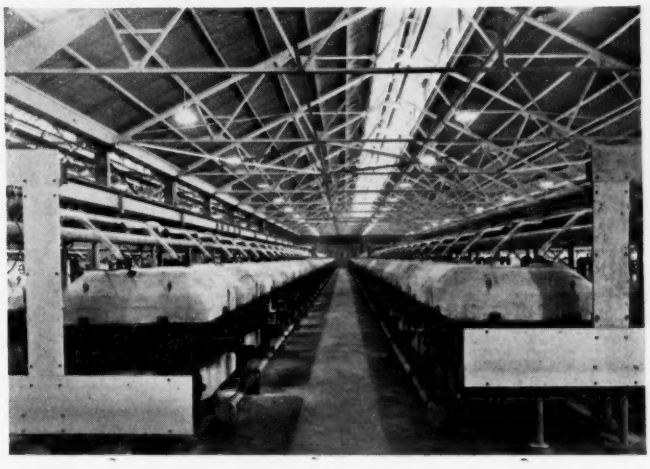
Largest Chlorine Unit in East Located at Natrium, W. Va.

Completion of the largest chlorine plant ever built as a single unit east of the Mississippi was recently announced by Columbia Chemical Div. of Pittsburgh Plate Glass Co., operators, and The H. K. Ferguson Co., engineers and builders.

Located at Natrium, W. Va., the new plant was financed by the Defense Plant Corp., constructed on schedule, and has been in operation for several months. Commenting on the size of the plant, it was pointed out that there are plants east of the Mississippi with greater capacity than this installation, but they were expanded over a period of time rather than having been designed as a single unit. Exact capacities were not announced, although Ferguson engineers said the plant was "almost as large as the biggest ever built as a single unit at Las Vegas, Nevada." That plant was also designed by the Ferguson Co.

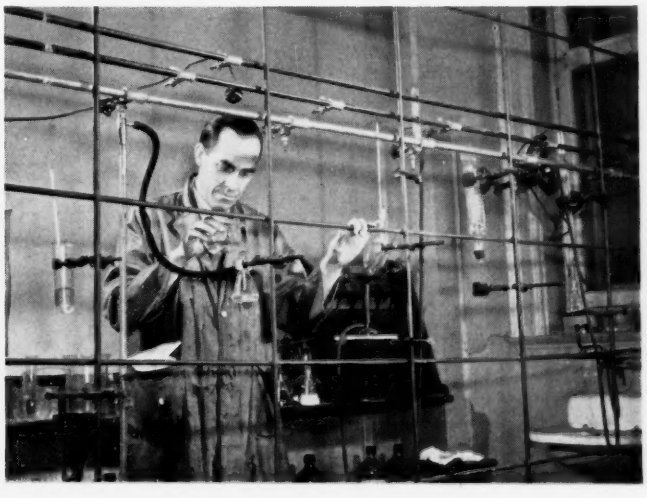
Above: Power house at water's edge supplies steam and electricity Extensive coal handling facilities unload barges directly to coal storage pile. Below, left: Million gallon pool stores brine supply. It is located several hundred yards across the highway from the plant, and is constructed on an elevation to permit gravity flow to the brine treatment tanks. Right: Interior view of the chlorine cell building, which was constructed from a second-hand steel frame. It is said to be one of the largest in the country.





CHEMICAL INDUSTRY BACKS WAR LOAN: Among the leaders at recent meeting to plan the chemical industry's participation in Fourth War Loan were, left to right: E. H. Anchors of the Air Reduction Co., who will act as Liaison Officer in the drive; W. R. Burgess, State Chairman of the War Finance Committee; C. H. Munson, president of Air Reduction and Chairman of Chemicals Division of War Finance Committee; and W. E. Cotter, director of the Commerce and Industry Section.

SUPER EXPLOSIVE: One of the major developments in this war is the large-scale production and use of R.D.X., said to be the world's most powerful military explosive. The picture below shows Dr. R. Boyer, one of the five Canadian chemists who helped develop the process, at work in his laboratory on further modifications of the process. Through cooperative research and development among the United Nations, R.D.X. is now being used as an important ingredient in blockbusters.



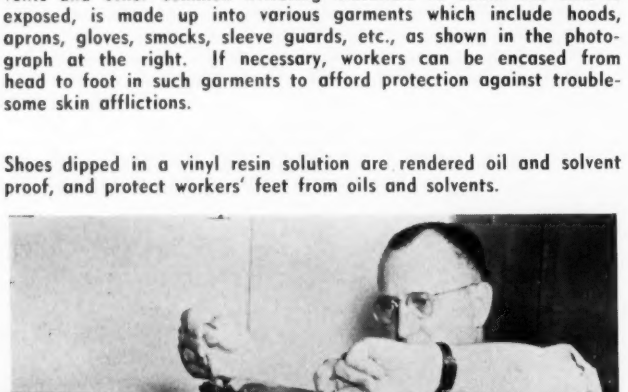
Vinyl Resin Clothing Guards Against Dermatitis

In the last few years there has been a high rate of incidence of both dermatitis and folliculitus as a direct result of the thousands of inexperienced workers in factory operations involving exposure to oils and solvents. As a result of the prevalance of these two diseases, steps have been taken in various industries to combat this hazard. A most effective means is to eliminate as much as possible the exposure of the skin to the irritating materials such as oils, solvents, and grime. Two of the common methods of accomplishing this are the use of protective skin creams and protective clothing.

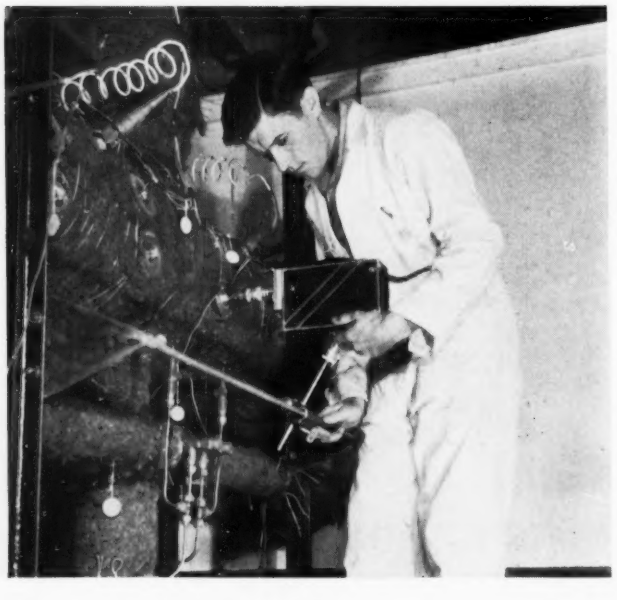
One of the most recent developments in the protective clothing method is the use of a vinyl resin material called compar, manufactured by the Resistoflex Corp. This material, resistant to oils, solvents and other common irritating materials to which the skin is exposed, is made up into various garments which include hoods, aprons, gloves, smocks, sleeve guards, etc., as shown in the photograph at the right. If necessary, workers can be encased from head to foot in such garments to afford protection against troublesome skin afflictions.

The workers' hands and the finish of the material being handled may be protected by the plastic curved-finger gloves.

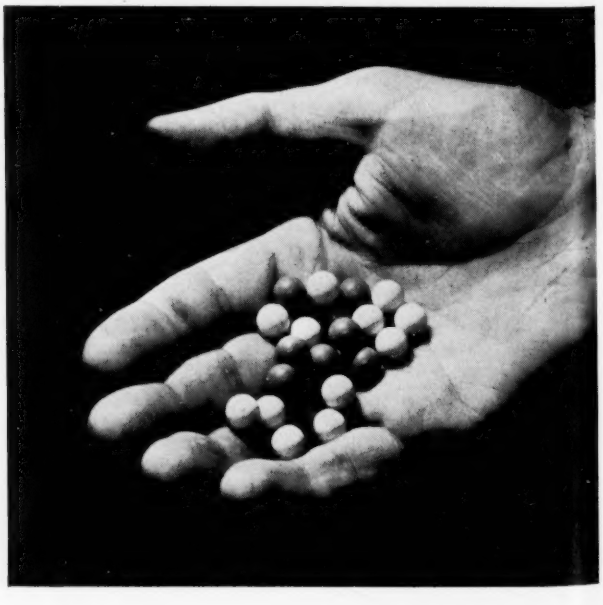
Shoes dipped in a vinyl resin solution are rendered oil and solvent proof, and protect workers' feet from oils and solvents.



PHOTOGRAPHING CONDENSING VAPORS: Dr. R. E. White, in the laboratories of the York Corp., is using a movie camera and a specially built condenser to determine at what rate of speed a refrigerant vapor gives up its heat load. Object of the research is to find method by which vapors will form in larger drops and leave more condensing area free, thus making possible the design of more efficient condensers.



PLASTIC BULLETS: Practice bullets of Tenite plastic are fired from anti-aircraft training guns, regular-size machine guns operated by compressed air instead of gunpowder, used on indoor ranges with small planes manipulated by wires as targets. The plastic pellets are white and fluorescent red. An ultra-violet spotlight causes the fluorescent ammunition to glow in darkened practice room, so that it has appearance of tracer bullets.



NEW PRODUCTS & PROCESSES

New Type Starch

Stein, Hall & Co., Inc. and American Maize Products Co. have developed a new starch product called Amioca which is said to have various industrial uses, such as textile warp sizing, finishing and printing, paper tub, calendar and coating work, veneer and laminating adhesives, box and envelope gums and liquid glues.

According to a report from Stein-Hall, the story of Amioca goes back to 1908, when an American missionary, whose mind was not too preoccupied with heavenly things to ignore earthly matters, found growing in China a new variety of corn and sent samples to the U. S. Dept. of Agriculture. The characteristic of this corn which distinguished it from the ordinary variety was that the surface of the cut kernels looked like hard wax. So it was natural for the name "waxy maize" to originate from this waxy appearance, although the kernels do not contain any wax. Present preference is to call this grain glutinous corn, deriving the name from the sticky or glue-like character of the cooked or pasted starch.

The corn which the missionary found was not well developed. The ears were puny and the yields per acre were poor. The U. S. Dept. of Agriculture's experimental station at Iowa State College, Ames, Iowa, became interested, and in conjunction with Iowa State College began developing hybrid having the pertinent characteristics of glutinous corn. These experiments covered a period of many years. American Maize Products Co. gave its financial and industrial assistance during the development of these seeds.

In 1942 a small quantity of seed having yields comparable with the best hybrid corns was available, and a small acreage of glutinous corn was planted. The crop was processed commercially by American Maize Products Co. Plant operations presented no great difficulties. Although starch yields were not good, the hybriding experiments were successful, and actual yields per acre were high enough to make glutinous corn a commercial crop. At the same time sufficient Amioca was produced to have it tested for industrial purposes.

Stein-Hall chemists have found that Amioca differs from ordinary corn starch in several respects, particularly in the character of the gels formed when heated with water. Compared with the brittle character of ordinary corn starch gels, Amioca gels are said to be long and gummy; remain in a fluid condition and do not tend to set back to a paste like ordinary corn starch gels, and are substantially clear in appearance as compared with the opaqueness of regular corn starch gels.

In these respects Amioca resembles tapioca flour more nearly than does corn starch. It is chiefly because of these properties that Amioca has been found successful for many purposes which tapioca has served.

Stein-Hall has also found that the resemblance of Amioca to tapioca flour is carried through in enzyme conversions as well as in the formation of dextrines. The amount of liquefying enzymes necessary to convert Amioca to a given viscosity is less than that required with corn starch and more nearly like the amount required with tapioca flour. In the manufacture of dextrines, the amount of acid required to produce dextrines of different types approximates more nearly the amount required with tapioca flour than with corn starch.

Trials with Amioca starch for textile warp sizing, finishing and printing are said to show results from warp sizing and finishing comparable with those obtained with potato starch and tapioca flour.

Clay coating of paper is done with casein, soya bean protein or starch, depending on whether or not water resistance is one of the specifications for the coated paper. Of the various starches used for coating, oxidized starches are generally regarded as the most satisfactory because of the better flow characteristic. Stein-Hall trials have shown that, when compared with oxidized starches, Amioca shows up well.

Stein-Hall also claims that as an adhesive Amioca can be used satisfactorily for veneer work, giving a fluid glue of high solid content and good bonding strength.

In 1943 additional quantities of hybrid seed were available and through contacts with the farmers arrangements were made to plant approximately 3,000 acres. This will make available sufficient grain to produce between four and five million pounds of Amioca early in 1944. Seed is now available for considerably enlarged acreage to be planted in 1944 for use as Amioca in 1945.

Putty Substitute

Glass instrument windows have long been puttied in—like panes in a sash. A laborious hand operation, much time is consumed in removing the putty smears from the glass. After extensive research, Westinghouse chemists have found a synthetic cement that seals the glass to the plastic instrument case far tighter than any putty. A simple, automatic machine applies a narrow band of the cement and the glass is pressed into place. Cement sets quickly in a low-temperature oven and glass cleaning is no longer necessary.

New Plastic

A new plastic, polythene, adaptable to the manufacture of products as varied as collapsible tubes for toothpaste, waterproof coatings, piping, adhesives and insulation for electric wiring and cables has been announced by the Plastics Department of E. I. du Pont de Nemours & Co., Inc.

This new member of the plastics family represents the culmination of intensive experimentation and development undertaken five years ago and coming originally from Imperial Chemical Industries, Ltd. Polythene is the generic name for the tough plastic manufactured by the polymerization of ethylene.

In announcing that polythene is now being manufactured in commercial quantities, the Du Pont Company emphasizes that the material is available in substantial quantities only by specific allocation for war purposes.

Supplies of polythene heretofore available have gone into production of items urgently needed by the armed services, where this new plastic has adequately demonstrated its advantages as a covering for electric wiring and cable.

Outstanding properties upon which it is expected that many important uses will be based include flexibility and toughness over a wide range of temperatures; unusually good resistance to water and to penetration by moisture; chemical inertness; and excellent electrical properties.

Possible future uses for polythene, when available, will be various types of containers including collapsible tubes for food and cosmetics; gaskets and battery parts; flexible tubing or more rigid piping; water-proof and chemically resistant coatings; and adhesives.

Polythene is claimed to occupy a peculiar place among plastics. In thin sections, it may be classified as non-rigid, yet it does not have the limp rubbery quality that characterizes most non-rigid plastics. However, thick specimens exhibit sufficient stiffness to warrant classification of the material among the more rigid plastics.

The new plastic is readily molded and fabricated by present methods with existing molding and shaping equipment. It can be extruded, injection molded, compression molded and calendered. In sheet, rod or tube form it can be machined, cut, blown, blanked or swaged.

Surface-Coating Process

Millions of dollars have been spent on paints, finishes, and treatments to delay the inevitable rusting or oxidation of metals. Conspicuous success has been achieved by treating metal surfaces with phosphoric acid solutions to increase paint adhesion and thereby improve corrosion resistance.

Zinc remained stubborn and would not take the phosphate coating evenly in the ordinary phosphating process. Early in this work a curious phenomenon was discovered. If the zinc surface is wiped with the hand, a brush, or a cloth before it is treated, excellent phosphate coating results. Just why this happens is not altogether clear. Nevertheless, many methods of wiping the zinc surface before treatment were attempted. In production, however, uniform wiping is difficult even on plane surfaces—on irregular objects it is impossible.

In manufacturing zinc-plated frames for outdoor-type watthour meters this problem of preparing the zinc surface to take the protective coating of paint became serious. A young Westinghouse chemist tackled the problem. He proposed doing the wiping chemically instead of mechanically. Countless dips were tried with indifferent and inconsistent results. One day he tried disodium phosphate with excellent results that could be duplicated as long as that particular batch of phosphate lasted. With the next lot of disodium phosphate the result was a failure. Obviously, there was something different about the previous bottle of phosphate, but ordinary chemical tests revealed no difference. Finally in desperation a more critical test was made and a faint trace of titanium—one part in a million—was found. Herein lay the answer. For some reason a mere whisper of titanium is the magic that makes the pre-dip solution of disodium phosphate work as a chemical wipe on zinc for subsequent and final phosphating treatment.

The process is now being applied extensively on a commercial scale for protection of hundreds of zinc-coated machine parts for both war and peace. Certain war implements receive a layer of zinc but three ten-thousandths of an inch thick. When given the titanium predip and the normal phosphate coating they are able to meet the 100-hour salt-spray test with ease. Without the titanium predip, corrosion appears in an hour or two.

The titanium-predip has several signal advantages for phosphate anti-corrosion treatments that are otherwise conventional. It secures a protective coating on zinc and provides a finish that does not necessarily require further coating. In some cases, to meet the salt-spray test, parts were made corrosion-resistant by electroplating first with copper and then applying a baked black-enamel finish. Phosphating with titanium predip is much faster, less expensive, requires no critically-short copper, and is many times more protective.

The predip can also be used for phosphating of steel. The resulting improvement in corrosion resistance is not always so marked as with zinc—nevertheless, it reduces the time required to form the protective coating.

Dyeing Process

The American Viscose Corp. has announced a new dyeing process. The company states that among the advantages of this "Vatru-Set" process, as it is called, is that it makes possible vat dyeing of fabrics that never before could be dyed by a vat dyeing process. Some of these fabrics include rayon, wool gabardine, viscose rayon shantung, viscose rayon fuji and viscose and acetate rayon challis types. Besides giving dependable color results, it is said to provide definite shrinkage control and full protection against fading from both acid and alkaline perspiration. The Vatru-Set method of vat dyeing is now being used with success on shirting materials and trousers for the armed forces.

Synthetic Menthol

A new method for the production of menthol has been developed by Dr. H. B. Haas and Dr. A. L. Barney at Purdue University according to a recent release from the American Chemical Society.

The new method is said to be a distillation process, beginning with thymol hydrogenated to a complex mixture of alcohols and ketones. Menthone is produced first, and this is then reduced to synthetic menthol.

The process is said to overcome the difficulty which has been present in making menthol from thymol—namely the elimination of isomers, compounds of the same elements in the same proportions by weight, but differing in chemical structure.

The product produced by this process is claimed to have the same taste and odor as natural menthol, and the pharmaceutical differences, if any, are slight.

Propylene Laurate

The Beacon Company has announced the immediate availability of propylene laureate, a light amber, edible, non-hygroscopic oil, which is completely dispersible in water (forming milky emulsions whose viscosity can be controlled); is miscible with alcohol, polyhydric alcohols, glycerine, glycol, hydrocarbons, solvents, oils, etc; possesses high boiling qualities; has a pH or 5% aqueous dispersion 8.0; and is non-toxic and practically odorless. Propylene Laurate should be of especial interest as an emulsifying agent for the manufacture of cosmetics, pharmaceuticals and food-stuffs. Because of its non-toxicity and purity, it appears to be ideal as a base for shortening. Its edibility and known physiological value suggest its use to replace Diglycol Laurate in food products. Manufacturers of emulsions for wood, leather and metals will be interested in propylene laurate's emulsifying action in oils, oil soluble dyes, hydrocarbons, etc. In lacquer emulsions it displays coupling and plasticizing properties. In dry cleansing preparation it is said to display powerful detergent and foam-reducing capabilities and does not build up pressure on the filters. Its tendency to retain moisture is said to be of interest to the paper and textile industries in connection with its use as a general emulsifying agent.

Waterproofing Process

A waterproofing process for cotton dressings which can withstand sterilizing by treatment with superheated steam has been described recently in an Indian medical journal (Ind. Med. Gaz. 77:413).

The cloth is soaked 24 hours in a saturated aluminum acetate solution, then treated in a steam chamber for 3 hours. After drying in air it is immersed one hour in a very hot solution of soap (8%) and glue or gum (2%). The dressing is then rinsed with water, dried in a drying chamber, and finally calendered. The water-repellency is derived from the presence of aluminum soaps, which are formed by chemical reaction between the aluminum compound and the soap.

New Plating Method

Certain copper or brass parts of aircraft instruments that carry high-frequency currents must be corrosion resistant. Electrically, they must have high surface conductivity because of high-frequency current skin effect. Nickel, normally used to provide anti-corrosion protection, has high electrical resistance. In seeking a solution to this problem, Westinghouse engineers turned to gold, which is non-corrosive, satisfactorily conducting, but costly.

Electrochemists finally evolved an answer that disposed of this particular worry and provided a plating technique valuable in many applications unrelated to the original need. Special plating anodes are made of an alloy of copper, tin, and zinc. With these soluble anodes, copper and brass parts are plated using standard plating practices.

The results are truly amazing, according to Westinghouse engineers. The plated surface has the necessary electrical conductivity for high-frequency applications and is superior to nickel in corrosion resistance. Further, the finish is mirror-like,

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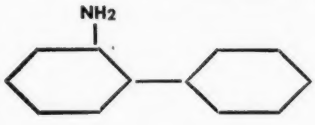
In addition to their long-established uses, these two low-cost Monsanto Chemicals have vast potential value in new applications and as replacements for materials made scarce by the war. If your company wishes sample quantities of these chemicals, they will be sent promptly upon request by wire or on your company letterhead. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

ortho-AMINODIPHENYL
(TECHNICAL)



Mol. Wt. 169.10

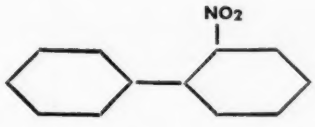
Standard Form: Fused solid.

Specifications: Purplish crystalline mass; crystallizing point 47.0°C. min.; assay 94.5% min. Distillation range: first drop, 295.0°C. min.; 95% (1-96 ml), 8.0°C. max.; dry point, 310.0°C. max.

Where ortho-AMINODIPHENYL may be used

1. Intermediate for chemical synthesis.
2. Intermediate in synthesis of dyestuffs such as quinoline yellows, lithol reds and hydron blues.
3. As a constituent of Phenol Formaldehyde resins.
4. A solvent, where a high molecular weight amine is advantageous.

ortho-NITRODIPHENYL
(TECHNICAL)



Mol. Wt. 199

Specifications: Light yellow to reddish crystalline mass. Crystallizing point 34.5°C. min

Where ortho-NITRODIPHENYL may be used

1. Intermediate for chemical synthesis.
2. In the manufacture of dyestuff intermediates such as 2,2′ Diphenyl Benzidine and its derivatives.
3. Plasticizer and component in resin compositions.
4. As a component and intermediate in insecticides.

MONSANTO CHEMICALS

SERVING INDUSTRY... WHICH SERVES MANKIND

being surpassed in this respect only by silver itself. As to abrasion, the surface is roughly twice as good as the usual nickel coating. The new plating is entirely non-magnetic (not true for nickel) and is easily soldered, a fact of great value in many electrical applications. Furthermore, the new plating process has great "throwing power." In other words, deep interior surfaces (in objects with cavities) are plated much more uniformly than is possible with nickel.

New Nitrocellulose Grade

To ease the shortage of ester solvents, Hercules Powder Company has developed a new grade of nitrocellulose having greater solubility in alcohol, according to a recent announcement.

Requiring a minimum of ester solvents, Hercules SS nitrocellulose is finding wide application in the production of high-quality lacquers. Tests indicate that SS nitrocellulose, which is available in four viscosities (¼, ½, 5-6, and 40-60 seconds), can be used in wood sealers, wood lacquers, printing inks, heat-sealing adhesives, and other special uses.

Tests conducted over the past year have determined the solubility of SS nitrocellulose in a variety of solvent mixtures comprising large proportions of alcohol, or alcohols with minor proportions of an aromatic hydrocarbon and an ester solvent, ethyl acetate. Triangular diagrams charting these results are available upon request.

It was found that the small amount of ester solvent required to dissolve SS produces lacquers that will spray satisfactorily under average conditions without blushing, and that will dry with very little orange peel or other imperfections, the company stated.

Hercules reports that SS lacquers possess the same properties of standard nitrocellulose lacquers, including quick-dry, flexibility, toughness, durability, and chemical resistance. Based on the relative supply picture of alcohol and of ester solvents, SS nitrocellulose is believed to have good postwar prospects.

Dielectric Material

Lectrofilm, a new synthetic dielectric material for capacitors, developed after several years of General Electric laboratory research, and made of materials available in the United States, has recently been announced.

The new product, development of which was hastened by the growing shortage of high-grade mica, can be best applied to the manufacture of most radio-frequency-blocking and by-pass, fixed capacitors used in communications and other electronic equipment. Lectrofilm is claimed to have a greater combination of desirable properties than was previously available in any one dielectric material. It is available in both rolls and sheets and can be used in present capacitor production lines with very little change in equipment or method of manufacture.

In addition, lectrofilm's strength and flexibility make it well-suited to automatic methods of manufacture. The careful control used in its production, together with its chemical stability, assure uniform properties and freedom from defects. Furthermore, it requires little grading or sorting before being placed into a capacitor production line. Compared with other dielectrics, lectrofilm requires less inspection and, properly applied, its use will cut down the number of finished capacitors that are rejected in test, thereby reducing the amount of labor and increasing production with present facilities.

General Electric is making Lectrofilm available for use by manufacturers making capacitors for the armed forces.

Vinyl Resin Tubing

The use of vinyl resin tubing for carrying organic solvents is expanding rapidly. One of the recent applications is its use in an improved hot doping method for airplane fabric surfaces. The new process was developed by Pan American World Airways System when it became necessary to apply camouflage finish to the upper and lower surfaces of airplanes in place of the aluminized dope used during peacetime. It was found that camouflage finishes cause a rapid deterioration of doped surfaces, and therefore frequent replacement of fabric. The usual method of applying many light coats of dope was no longer satisfactory as it kept the planes out of service for long periods of time.

A new technique was developed to overcome this difficulty. It involved heating the viscous colloidal dope to 175° F. at which temperature the viscosity is lowered sufficiently to permit application with standard spray gun. More solid material was thus applied to the surface by heating the dope to reduce viscosity rather than by using thinners.

Although the hot-dope technique seemed to eliminate the difficulties from an operational standpoint, a major problem arose in finding a hose to withstand the action of organic chemicals at elevated temperatures without deterioration of the hose and contamination of the dope, and which would also permit rather rough handling as in shop practice. After a series of tests it was found that a special type of vinyl resin tubing developed by the Resistoflex Corp. under the name compar satisfactorily met requirements.

Although the outstanding characteristics of vinyl resin tubing are said to be inertness to organic solvents and its wear and abrasion-resistant qualities, its immunity to temperature extremes within a range of minus 70° F. to plus 300° F. is an important quality which endures throughout the life of the tube.

Halfway between a synthetic rubber and a plastic, compar is molded by modifications of the techniques common to both the plastic and rubber industries. It is converted into continuous tubing by automatic extruder machines varying in predetermined durometer hardness, resistance to organic solvents, resilience and translucence according to specifications determined by its use.

Chlorinated Paraffin

Swift conversion of equipment from the production of chlorinated rubber to chlorinated paraffin in the months after the U. S. entered the war helped to avert a shortage of flame-proofing chemicals for tents, tarpaulins, and other textiles, according to a recent statement of E. G. Crum, manager of the Parlin plant of Hercules Powder Company.

Planned to produce about 4,000,000 lbs. of chlorinated rubber annually, the chlorinating plant at Parlin was converted by Hercules chemical engineers after the Japs had cut off the supply of high-grade crepe rubber required for making chlorinated rubber, which had gone into flameproof fabrics for military use.

The chlorinating equipment was converted to meet the greatly increased demand for chlorinated paraffin, a flame-resisting plasticizer which is one of the main constituents in the flameproofing compound.

The Parlin staff began on April 20, 1942, to convert to a new raw material and a new process. By May 8, the details had been perfected to the point where a 7,500-lb. batch of chlorinated paraffin was made.

During May, 1942, Parlin produced over 200,000 lbs.; two months later, the output had passed 1,000,000 lbs.

Today, he said, chlorinated paraffin is being used to make fabrics flameproof and waterproof, protecting big guns, stores of supplies, combat vehicles, aircraft, and other material, in addition to its principal use in tentage.

Silver Babbitt

Silver Babbitt metal is now being produced by the National Bearing Metals Corp. as the result of research by the Battelle Memorial Institute.

When the tin supply was cut off Battelle set out to create a Babbitt that would have the same bondability and corrosion resistance as that of tin-base Babbitts and which would retain its hardness at operating temperatures. The answer was found in silver alloyed with a properly balanced lead-base Babbitt.

PHOSPHORUS...
the problem killer

Like the fabled beanstalk of Jack-the-giant-killer fame, the roster of phosphorus compounds keeps on growing and growing. Friendly phosphorus joins hands readily with other elements to form an endless variety of unusual and interesting compounds.

Many of these phosphorus compounds have been the subject of intensive study by Victor research chemists. Physical and chemical properties have been determined and cataloged.

For many of these compounds only potential uses have been recorded . . . yet others, which only a few years ago were regarded more or less as chemical curiosities, are today serving useful functions in industry. Each has met the challenge of a pressing problem.

A catalog of Victor chemicals in commercial production . . . including a comprehensive list of recently investigated phosphorus compounds . . . is available upon request. Perhaps one of these Victor Research Chemicals may solve a problem for you.

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NEW EQUIPMENT

Vacuum Switches QC334

Four new vacuum switches for a wide variety of radio and industrial switching applications have been announced by the Tube Division of the General Electric Company's Electronics Department. They can also be adapted to oil- or water-immersed operation because of their enclosed construction and are especially applicable for hazardous installations where fire and explosion are a constant risk, as in flour mills, magnesium finishing rooms, and similar dust-laden atmospheres. Two of the new switches are also designed for high altitude applications.

Since the contacts of the switches are mounted in a vacuum, they are relatively free from the effects of corrosion and arcing, and are unaffected by dirt or oxidation. The vacuum-type construction also gives the switches a high current rating for their size and permits them to handle enough power to operate equipment at greatly reduced voltages.

Operating without auxiliary contactors or relays, the switches can be used on installations where space is at a premium. No self-contained coil or other operating mechanism is built into the switches. Movement is obtained from the mechanism to be controlled, or from other apparatus to suit the application. This movement can often be provided by a slow-moving cam or by the movement of a thermostat, as in air-conditioning or refrigerating equipment. Air or liquid bellows, a rod-linkage system, or almost any other means can be used to operate switches of this type.

An external fulcrum is eliminated by the use of a flexible diaphragm which transmits movement to the contacts and acts as a natural fulcrum point for the operating arm. The contacts close without vibration, making it possible to mount these switches on or near delicate instruments.

Surface Testing QC335

The development of two new machines for controlled testing, measurement and evaluation of the flexibility, scratch hardness and adhesion of paints and other coatings, was announced recently by Kam N. Kathju, technical director of The Arco Company, manufacturers of industrial, automotive and special infra-red camouflage paints.

The machines were developed to provide for the accurate measurement of the basic characteristics and progressive deterioration of surface films. Their use in the Arco research laboratories over an extended period has demonstrated their dependability, according to Mr. Kathju.

Tests and measurements of flexibility are made on a machine known as the Arco Elongauge. This has been developed around a conventional Erichsen sheet metal testing machine, which was adapted to provide complete automatic controls and accurate measurements for cycle testing. The machine is mounted with its observation well in a vertical position so that water from a hypodermic syringe is in contact with the paint film being tested. Two wires, one of which is attached to the test panel and the other to the hypodermic needle, are connected to a galvonometer.

The machine is operated by a constant speed drive geared to thrust a 3/16 inch spindle against the back of the test panel which is clamped between two anvils. The paint film being tested acts as an insulator. When it fails, the water contacts the steel test panel and the bimetal condition completed by the presence of a copper needle causes a current to flow. This deflects the galvonometer which signals the end point of the test.

The thrust is measured in 1/100 mm. and is converted to percent of elongation by a fixed table. In this way the points at which failures occur on identical panels after various degrees of exposure can be accurately measured, recorded and compared.

Scratch hardness and adhesion are measured by the Arco Microknife. This consists of a diamond point cutting tool which is applied to the surface being tested by a lever arrangement carrying beam and weight. The load, measured in grams, is applied to the point which moves across the surface at a constant speed and cuts repeatedly in a fixed position until the sub-surface is revealed. The load on the beam and the number of strokes required to wear through the film are the measure of scratch hardness. The diamond point tool is rotated at each stroke to maintain constant sharpness over long periods.

Used in connection with a movable platform which can be adjusted laterally by a precise screw thread and notched wheel, the Microknife becomes an accurate adhesion measuring machine. Tests are accomplished by applying a standard stress at progressively smaller spacings until the stress is sufficient to displace the coating in the area between cuts. By this means it is possible to measure the relative adhesion of a given coating to various base metals and sub-coatings, as well as to record changes in adhesion caused by aging of the paint under various conditions.

Carbon Heating Coil QC336

A graphitic carbon heating coil which has proved highly effective for heating tanks containing acid cleaners used to prepare aluminum aircraft parts for spot welding, has been developed by the Heil Engineering Company.

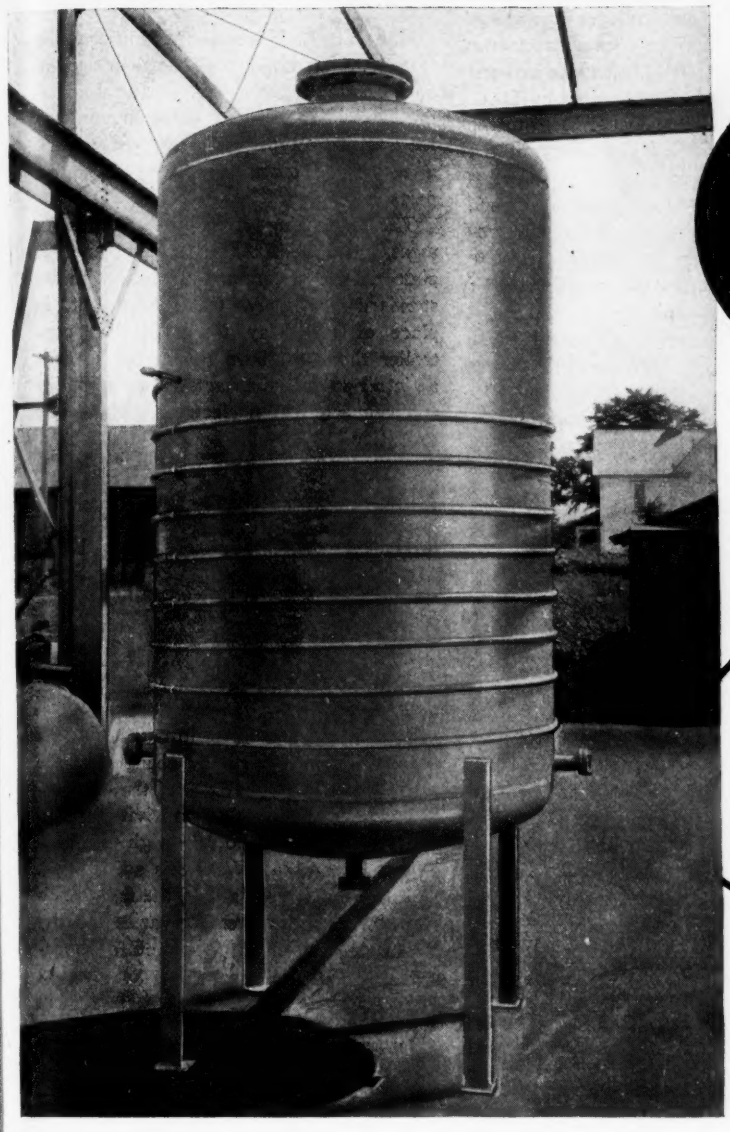
This coil, which is made in standard sizes and in any shape for a wide variety of uses, is impervious to chemical action, is entirely non-metallic, and has a heat conductivity between that of steel and copper.

It can be used for heating pickling, electroplating and metal etching baths, and is particularly effective for muriatic pickling and other chloride processes which now require heating for best results. It is unattacked by many of the chemicals which attack metallic heating coils.

The coils are supplied for simple heating of solutions, and steam jets of the same material are supplied for direct introduction of steam to perform both heating and agitation.

Twin Pump Unit QC337

A new twin pumping unit has recently been developed by the Blackmer Pump Company. The pumps are 90 GMP capacity (each) for pressures up to 100 psi and are mounted on a cast-iron base.



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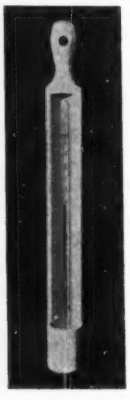
A single 1800 RMP motor serves as a driver through a reduction gearing. The operation of the pumps is controlled by newly designed twin clutches. The pumps may be operated singly or together.

This new unit was developed primarily for use in petroleum bulk and blending plants, but it is believed that units of this type will have many applications in the industrial and processing fields. The chief advantage of this unit appears in the fact that it provides double capacity to take care of temporary peak requirements, or that it permits the handling of two different liquids without contamination. The pumps operate on the "bucket design" (swinging vane) principle and are furnished in three constructions; unlined, with removable liners for handling corrosive or abrasive liquids, or the pumps may be furnished with steam-jacketed heads for pumping highly viscous liquids, or materials that are solid at room temperatures.

Porcelain Thermometer QC338

With wood, brass and other metals difficult to secure, porcelain has been used for the first time to form the frame of this re-designed thermometer by the H-B Instrument Co. The unit is used chiefly in the petroleum field to determine the temperature of liquids in tank cars and other containers. The number of parts



have been reduced from 14 to 4, and the weight increased from 4 oz. to one pound. The greater weight permits the thermometer to sink freely in viscous liquids. Frame, handle and cup are all in one piece. Tube is attached to frame with two monel metal bands. Units are available now in a range of 0 to 160° F. with a red liquid filled tube graduated in single degrees, but other ranges can easily be made up to a top limit of 700° F., or even higher.

Simplified Electron Microscope QC339

The General Electric Company is now producing a small quantity of simplified electron microscopes which will soon be shipped on high priority orders to industrial laboratories and colleges in various parts of the country to obtain experience on the use of the simplified units in various fields. This was announced by D. C. H. Bachman, in a talk December 4 to the New York Microscopical Society at the American Museum of Natural History.

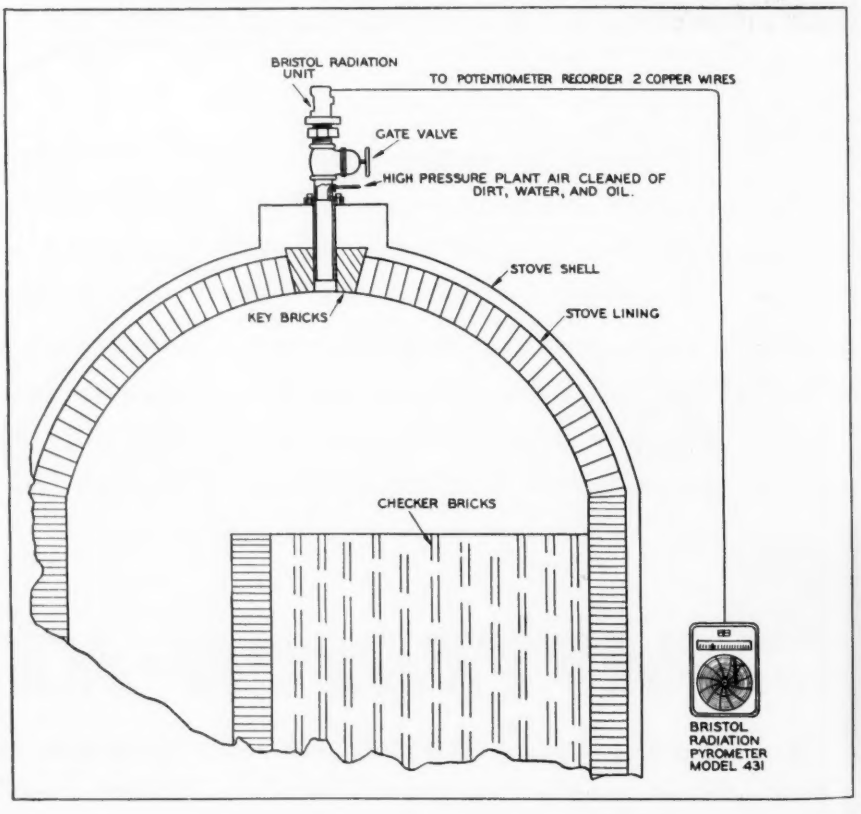
The General Electric design is claimed to be unique in that it employs electrostatic lens which do not require accurate voltage regulation. Component parts of the microscope are the same as those announced a year ago when General Electric demonstrated a "war model" of the microscope at the National Chemical Exposition in Chicago. The new instruments, however, are now "housed" in a desk design for convenience of operation.

These G. E. microscopes, which operate on ordinary house current, are capable of producing images 10,000 times the size of the specimen, and are approximately ten times more powerful than the best light microscope, Dr. Bachman explained.

Temperature Recorder QC340

The Bristol Company has designed a fixture adapting their new Radiation Unit to the measurement of stove dome temperatures. The fixture consists of a gate valve to enable the unit to be removed for service and an air purge to cool the lens and unit. The drawing below shows how the equipment is installed.

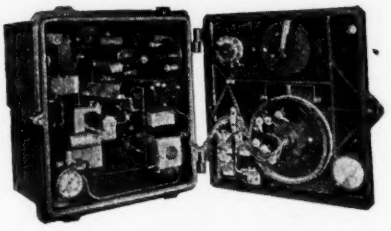
The Radiation Unit is used in conjunction with Bristol's new Pyromaster Potentiometer.



Pneumatic Controller QC341

The C. J. Tagliabue Manufacturing Company has announced the development of the new Celectray Pneumatic Indicating Controller—said to be the first instrument of this type that does not employ a motor or other continuously moving parts.

The measuring circuit in this instrument, including the galvanometer and the photoelectric system are identical with the standard Celectray Controller, but in place of the relay found in that controller there has been substituted a magnetic air-valve which acts as an amplifier and converter from electric to pneumatic operation.



The light beam "follow-up" flag is moved back and forth by changes of the air pressure in the bellows of the "follow-up" assembly unless the sensitivity-adjusting arm is turned to the highest sensitivity on its scale. With this adjustment, the throttling range is zero, the flag stands still as the control pressure varies and the controller acts as an on-and-off or open-and-shut controller, opening or closing the valve to its limits for small changes in

8 reasons why CARBON and GRAPHITE are ideal materials for industrial applications

THE Carbon and Graphite and "Karbate" materials manufactured by National Carbon Company possess chemical and physical properties ideally suited for many applications in the chemical and process, petroleum, metallurgical, textile, electrical and mechanical industries. A choice of grades, with or without several processing treatments, will meet specific conditions requiring a *combination* of properties found exclusively in these materials.

A few of these properties are illustrated on this page. A careful study of these will reveal applications assuring trouble-free operation and low maintenance cost. National Carbon Company engineers will be glad to consult with you on your problems.

The word "Karbate" is a trade-mark of National Carbon Company, Inc.

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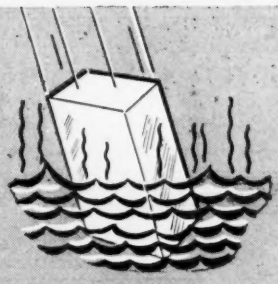
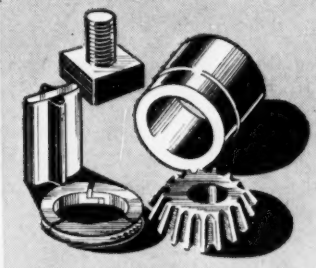
1. Corrosion resistance. Carbon and graphite are inert to all but highly oxidizing conditions, and to most acids, alkalies and solvents.

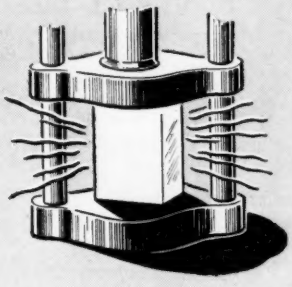


2. Resistance to thermal shock. Carbon and graphite do not spall or crack even under sudden and extreme changes of temperature.

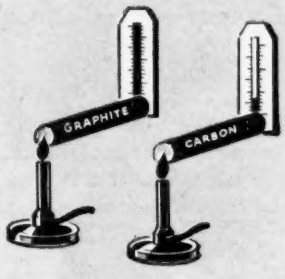
3. Absence of contamination. Carbon and graphite are insoluble and are not picked up in caustic and spin bath solutions.



4. Ease of fabrication. Carbon and graphite are readily machinable to intricate shapes and close dimensional tolerances.

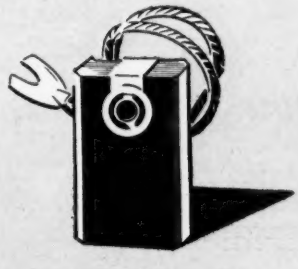


5. No deformation at high temperatures. Carbon and graphite retain their shape in extremely high temperatures.



6. High or low heat transfer. Graphite has *high* heat transfer properties; carbon has *low* heat transfer properties.

7. Not wet by molten metal. With carbon and graphite, molten metals flow freely without slagging or sticking.



8. Electrical conductivity. Carbon and graphite have various degrees of conductivity for a very broad range of electrical conditions.

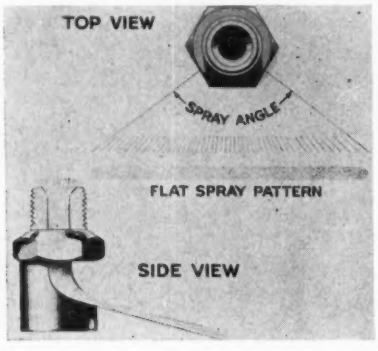
NATIONAL CARBON COMPANY, INC.
Unit of Union Carbide and Carbon Corporation
UCC
Carbon Products Division, Cleveland, Ohio
General Offices
30 East 42nd Street, New York 17, N. Y.
Branch Sales Offices
New York, Pittsburgh, Chicago, San Francisco

temperature, for example. Now as the temperature varies, the light image moves across the controlling edge of the flag and more or less of the light reaches the phototube. More light on the phototube causes more current to flow through the magnetic air valve. This in turn draws in the armature, moving the orifice tongue closer to the orifice in the block and raising the controlled air pressure. Less light on the phototube thus lowers the controlled air pressure by decreasing the current to the magnetic air valve.

If the sensitivity is lowered by moving the arm to a lower value on the scale, then the flag will follow the light beam as it moves back and forth with changes of temperature. The flag will follow to the limits of the throttling zone as determined by the position of the arm.

Flooding Nozzle QC342

A new flooding nozzle developed by Spraying Systems Co. is said to be particularly useful where an exceptionally wide flat spray is required.



Designed for use in spraying eliminator plates and similar applications, the flooding nozzle is available in brass and other standard materials.

Air Compressor QC343

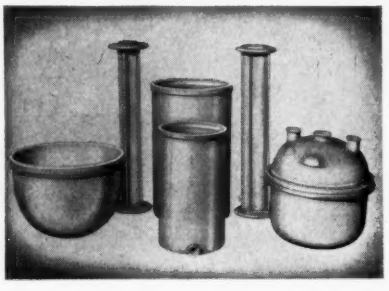
A new "Industrial-Air" Compressor, Class WG-9 developed by the Sullivan Machinery Co. is said to be particularly applicable for heavy duty, continuous 24-hour per day service in smaller industries or for specialized needs in larger plants.

It is a single stage, double acting, water-cooled vertical unit with exceptional capacity per square foot of floor area. Large smooth air passages throughout the unit assure unrestricted air flow from intake to discharge. Truncated piston design gives large valve and head radiation area and valve assemblies are easily accessible for inspection.

Valve cage ports and cylinder assemblies have liberal water jacketing for high cooling efficiency. Because of its smooth running characteristics and the small floor area required, the WG-9 needs only a simple block type foundation. Automatic stop and start control can be furnished.

Chemical Porcelain QC344

Due to the increased demand, particularly in the pharmaceutical field, for a white, iron-free ceramic product, General Ceramics Company, Chemical Stoneware Division, has announced Cerawite, their chemical porcelain for industrial purposes.

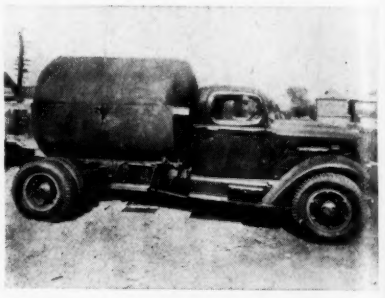


Most of the General Ceramics standard equipment made in chemical stoneware can now, with the exception of the larger shapes, be furnished in Cerawite, which has a brilliant white glaze over a dense white body with zero absorption, and is iron-free.

Glass Insulated Truck QC345

A demonstration of the effectiveness and versatility of modern heat insulating materials is offered by the Fiberglas-insulated tank trucks employed by the Cardox Corporation, Chicago, to transport liquid carbon dioxide to industrial plants in which the Cardox fire exinguishment system is installed.

The system involves storing up to 125 tons of the liquid Co_2 in a centrally located tank in the plant. To keep the Co_2's pressure at a relative low of 300 pounds per square inch while being carried to the plant in the company's trucks, the temperature must be maintained at zero, Fahrenheit, even though atmospheric temperatures may range near the 100 mark.



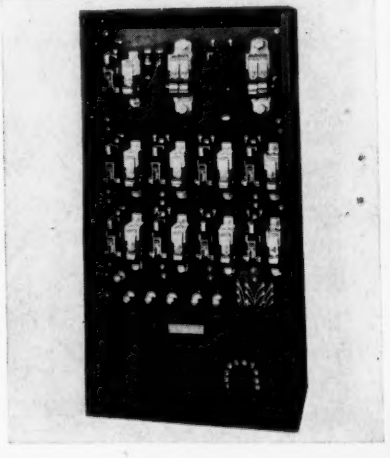
Sides and ends of each truck's tank are insulated with three 2-inch layers of Fiberglas in the form of boards sufficiently flexible to fit on a curved surface.

Ends of the tank are finished with mastic. Sides are covered with asphalt paper held in place with metal bands. A metal pan, secured to the channel irons of the chassis, protects the insulation and helps hold it in place on the lower half of the tank. The entire tank, with its "glass overcoat," is covered with a removable metal shell.

Voltage Selector QC346

A new magnetic voltage selector manufactured by Zenith Electric Company, is said to have advanced features for precision and efficiency.

This unit while especially developed for a new electro-plating process, for anodizing aluminum on A.C., has many other uses where like applications of current are required.



The Zenith Selector is for transferring in steps from 2 to 40 volts. The arrangement is such that when transferring, the main contact opens before the secondary contact opens, and closes after the secondary contact is closed. Arcing is thus effectually eliminated.

PACKAGING & SHIPPING

by T. PAT CALLAHAN

Summary of Chemical Packaging Situation

CHEMICAL containers of all kinds are becoming more and more essential in the war effort and careful consideration must be given to all forms of chemical packaging if shortages are to be averted in shipping chemicals. The following summary of the more essential packages used in the chemical industry may be helpful as a guide in the determination of proper packaging:

T. Pat Callahan

Steel Containers: Steel drums are still critical and must be re-used whenever possible. All forms of metal used in containers are critical and re-use and substitution are the only alternatives. However, light gauge metal drums used for several trips will show signs of weakening, and replacement for these damaged containers should be requested from the Containers Division of the War Production Board.

Fibre Drums: The supply of wood pulp used in the manufacture of fibre drums is being directed by the Requirements Committee of War Production Board. The fabricators of fibre drums are doing remarkable work and under very difficult conditions have been able to keep up deliveries of these containers for packaging chemicals. However, there is rumor that the allocation of fibre drums under Conservation Order M-313 may be lifted. The vast majority of chemicals packaged in fibre drums carry a rating of AA-3 under Preference Order P-140 and if this Conservation Order M-313 is eliminated, the procurement of these containers may be more difficult. It is advisable to keep in touch with any changes in the present Conservation Order M-313 so as to be guided in the proper procedure to follow in the procurement of the fibre drums.

Corrugated and Solid Fibre Boxes:—Deliveries of these containers are still controlled by Preference Order P-140, and deliveries from suppliers are extended to as far ahead as April, 1944. Again the War Production Board advises that wherever possible these containers be re-used. The most critical shortage in the whole container field seems to be wood-pulp from which these containers are made.

Slack and Tight Wooden Barrels:—These containers are being used extensively in the chemical industry and any shortage is attributable to manpower in the procurement of raw materials; namely, the logs in the woods. In a great many cases wooden barrels are being re-used and if properly handled, can be re-used several times.

Multiwall Paper Bags:—The huge demand for multiwall paper bags in the shipping of chemicals has placed unusual demands upon all manufacturers of these containers. Curtailment of pulp to the manufacturers of multiwall paper bags may lead to some form of allocation on the part of the War Production Board. Any user of multiwall paper bags will do well to watch very carefully his stocks and future orders, and try to determine as far in advance as possible his future requirements. Multiwall paper bags being light and using a minimum of critical materials, have been substituted in a great many cases for containers using considerably more critical material per pound of net weight carried, and it will be most difficult to procure a substitute for multiwall paper bags if they cannot be obtained.

Wartime Changes and Post-War Packaging

Containers developed now when substitute materials are being used will be forced to withstand heavy competition when conditions return to normal, and all forms of materials for the fabrication of containers used to ship chemicals are available. In some instances more substantial packaging will be required, and in others, less.

Due to present conditions for example, the Interstate Commerce Commission has amended certain of its regulations for the transportation of Dangerous Articles, "for the duration." These amendments were promulgated "for the duration" in order that certain restrictions, which in normal times were held to be necessary and safe might be modified in war times. It is reasonable to expect that in most instances these modifications will be lifted when the war is over, and a return made to the original regulations.

However these various substitutions which are being made afford a remarkable opportunity to shippers to evaluate the value of these substitute packaging materials, in order to decide which will be the safest, most economical and most practical container to adopt. In normal times most of the packaging materials which have been substituted would not have been considered, but now that they are being considered and used it is in order to determine whether the original or the substitute is the most satisfactory. This presents a wonderful opportunity for both small and large shippers of chemicals and should not be overlooked.

Metal Container Quotas

The War Production Board announced January 3, a list of 169 different products that may be packaged in metal containers this year, in making estimates of 1944 quotas. The list of quotas contains 22 items that could not be packaged in metal containers last year.

To make possible the 1944 packs, an estimated total of 1,900,000 tons of prime plate has been allocated, as compared with 1,550,000 tons of prime plate used in 1943.

The 22 new items to be packed in metal containers are: Alcohol, inflammable cleaning fluid, hydraulic brake fluid, movie film, polishes and waxes, roof coatings, turpentine, lubricating oils, motor oils, putty and caulking compounds, lacquers, shellacs, liquid disinfectants and germicides, anti-freeze, varnishes, liquid insecticides and fungicides, varnish remover, lemon juice, sweet syrups, cranberries, pimientos, and boned chicken.

This year there will be a small quantity of orange juice and blended orange and grapefruit juice packed in cans for U. S. civilians. None was packed in cans last year for use by U. S. civilians.

This action was taken by the issuance of Conservation Order M-81. Schedules I, II, and III, as amended. The schedules of the amended order have been correlated with glass container order L-103-b, permitting increased packs in some cases.

Glass Container Quotas

The 1944 quotas of new glass containers, as well as metal caps, in general permit the use of approximately the same number of new glass containers and metal caps for packing certain products as was used in 1943, the War Production Board Containers Division announced January 5.

Production of glass containers in 1943 was approximately 92,000,000 gross, and production during 1944 is expected to equal or perhaps exceed that figure slightly, Hugh A. Carroll, chief of the Glass Containers Section, said. Quotas for 1944 are designed to bring the permitted use into balance with the productive capacity of the glass container manufacturing industry, he pointed out. Permitted uses cover the packaging of essential products, including foods, drugs, chem-

CROWN
is in this picture
TWICE

No, none of the more familiar Crown products of peacetime are on view!

But the canisters that hold the filter elements for those gas masks are a Crown wartime product . . . produced by the million in the Crown plant to safeguard military, naval and civilian users.

And those waterproof metal ammunition boxes are another Crown product . . . another example of the way all of Crown's facilities have been enlisted in the service of a nation at war!

Meanwhile . . . the less dramatic but no less necessary products . . . cans in which to pack food for fighting men and for the home front . . . cans for the essential products which can not be successfully packed in other ways . . . continue to roll from Crown's production lines! Crown is doing double duty these days!

CROWN CAN COMPANY, New York • Philadelphia. *Division of Crown Cork and Seal Company,* Baltimore, Md.

★ ★ ★ ★ ★ CROWN CAN

icals, cosmetics and beverages, and specific quotas for each product are fixed by WPB.

A new WPB glass container Limitation Order L-103-b, which now incorporates the metal closure limitation Order M-104, was issued effective January 4, and the former M-104 was revoked. The new order covers only new glass containers and caps, and does not affect their reuse. Subject to specific exceptions, it lists the only products that may be packed in glass containers and with metal closures, and the closure materials that may be used in each case.

Some 91 food products, 39 drugs, 47 chemicals and many cosmetic and toilet products, which may be packed in glass containers with metal closures, are listed, and specific quotas for 98 per cent of the glass production are set up. In general, the quota schedules of the new order follow the plans of former orders L-103-b and M-104.

The new order and the amended metal can order M-81, which was issued on January 3, 1944, form an integrated container program designed to provide containers to the extent permitted by the listed quotas.

Quotas, under the new Order L-103-b, permit the use of metal closures on glass containers for certain cosmetic preparations in the ratio of 50 to 85 per cent of the glass containers allowed for 1944. A quota of metal closures for coffee containers has been established at 50 per cent of the glass containers allowed for 1944. Although glass containers for packing tobacco and snuff remain at 100 per cent of the 1943 use, closures of metal are still prohibited in the new schedule.

Glass container use for home canning remains unlimited, as do metal closures therefor. However, the manufacture of zinc mason closures of 70 mm. or over is now allowed at 60 per cent of the 1941 production, and certain top seal metal lids larger than 70 mm. may be made to the extent of six per cent of production in the base period. The manufacture of other home canning closures is unlimited.

Certain products, which previously were allowed the use of gallon and half-gallon size glass containers, are now in most cases restricted to the smaller sizes only; they include edible liquid oil; fungicides; disinfectants; livestock or agricultural solutions and sprays; paints and allied products; liquid polishes, including furniture, auto, metal and floor polishes, and putty. Order M-81, it was pointed out, provides the larger size metal containers for use where large glass containers are prohibited.

Exporters are prevented from shipping more empty glass containers and metal closures out of the country than they exported in 1943, under a new provision of the order.

Multiwall Bags Standardized

Multiwall paper sacks, characterized by some trade experts as an important trend in bulk packaging that has resulted from the war, are now standardized for all Government and many commercial purchases to achieve the most effective use of such containers in domestic and overseas shipments.

Comprehensive standards covering design, strength and other factors have been defined for the first time in the new Federal Specification UU-S-48, effective January 1.

Government and industry technicians for the past year have been studying how to provide the best possible sacks with minimum consumption of materials. Collaboration of the National Bureau of Standards and the Conservation, Chemicals and Containers Divisions of WPB, with important assistance from the Paper Shipping Sack Manufacturers working through their industry advisory committee, has resulted in the issuance of Federal Specification UU-S-48, which stipulates standards for five types of sacks, covering strength, weight, acidity and stretch of plain and wet strength papers, construction details and methods of testing quality of paper used. Factors to be considered in the selection of the most suitable types for a particular product are enumerated.

The new specifications are expected to relieve the current bottle-neck in steel, fiber and wooden drum shipping containers while also providing important savings in cost of containers and in shipping weight and space. They also will enable manufacturers of multiwall shipping sacks to put their production on the most efficient basis by concentrating on certain standard types and by consuming the minimum of woodpulp and other precious materials. This will help industry to use the largest amounts of sacks possible under conditions of unprecedented demand for paper products.

New MCA Manuals

Two revised manuals and one new manual have recently been issued by the Manufacturing Chemists' Association, 608 Woodward Building, Washington, D. C. These manuals deal with safe handling of chemicals.

The two revised manuals are Manual Sheet D-32 entitled "Faucets, Metal for Discharging Contents of Steel Barrels or Drums" and Manual Sheet C-3, "Carboy Bottle, Glass" (When Used For Any Product Authorized For Shipment Therein). The new manual is Manual Sheet TC-5 (For Consignees) entitled "Unloading of Anhydrous Hydrofluoric Acid From Tank Cars ICC 705A Series." This last manual is a result of a growing demand for information concerning the handling of Anhydrous Hydrofluoric Acid from tank cars and contains both pictures and prints showing proper methods of handling this material.

All these manuals are available at a nominal cost from the Manufacturing Chemists' Association of the United States 608 Woodward Building, Washington 5, D. C.

Paper Container Use May Be Cut

The extreme shortage of wood pulp may cause the War Production Board to shortly issue limitation orders which might restrict the use of various forms of paper and fibre in shipping containers to the more essential uses. However, it would appear that chemicals are considered in the more essential bracket, but it will be well for all users of this form of packaging to watch their supply very carefully and be certain that orders are placed sufficiently in advance to insure delivery. It definitely seems that this critical wood pulp shortage will eliminate the packaging of certain materials in paper and fibre containers and very careful scrutiny of all container requirements is absolutely essential.

Military Demands for Steel Drums May Ease

The huge supplies of steel drums allocated to the various government agencies has created an inventory which may release for other uses certain steel which can be allocated to civilian use. Naturally, the Armed Forces have first call on the procurement of steel drums and if their requirements are sufficiently taken care of, there is reason to believe that some additional steel drums may be made available to the chemical industry. The Containers Branch of the War Production Board is expected to revise Limitation Order L-197 in the near future and this revision should be watched very carefully by all chemical shippers.

Can Manufacturers Meet

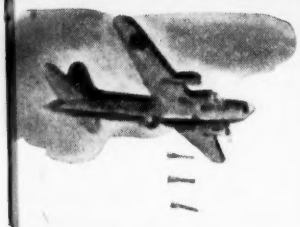
The Can Manufacturers Institute re-elected F. J. O'Brien of Continental Can Co. president of its fifth annual meeting in New York on December 13. Other officers elected were: H. Ferris White, executive vice-president; and Clifford E. Sifton, secretary and treasurer.

In his address to the meeting Mr. O'Brien expressed an optimistic view of the industry's future. He stated: "It is hoped that in the early months of 1944. sufficient steel will be released so that can manufacturers will be enabled to resume production of many types of steel containers previously prohibited."

Diamond Chlorine

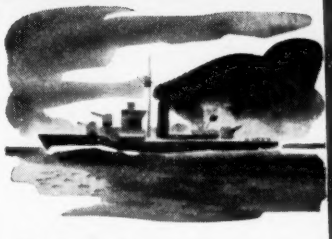
at war

helps America's Victory Drive!



Chlorine Helps Make Bombers

In building a bomber, approximately one ton of Chlorine is used—in electric wire insulation, in plastics, for cooling motors, in cleaning metal parts during manufacture.



For Smoke Screens

Chlorine is used as an ingredient in the manufacture of smoke screen materials, widely used by ground and air forces as well as in naval warfare.

Defense Against Poison Gases

The best decontamination agents developed to date are Chlorine compounds. Uniforms and equipment are thus protected against war gas, and also decontaminated after exposure.

Dyes for Every Uniform

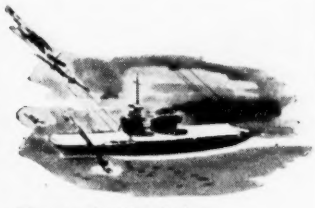
In the tremendous and exacting job of providing dyes for uniforms and clothing, as well as for other fabrics, Chlorine plays an important part.

Medical Supplies Use Chlorine

In the preparation of the life-saving Sulfa drugs, Chlorine is a part of the product. Chlorine is used to manufacture bromine, used for medical purposes.

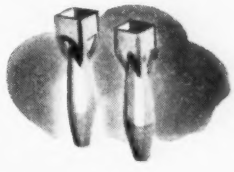
Field Water-purifying With Chlorine

In the field, portable chlorinators have proved of great value. In addition, our soldiers carry Chlorine tablets for purifying small quantities of water.



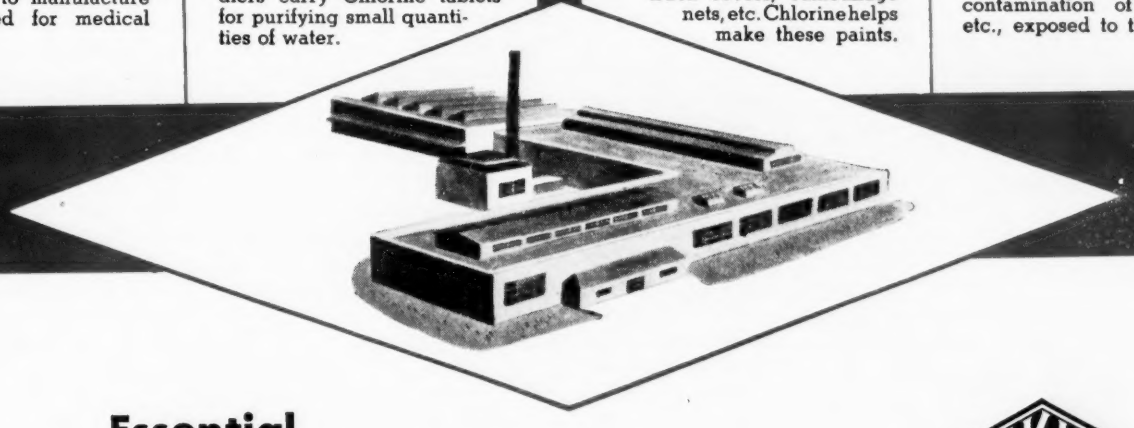
Flame-retarding Paint

An important and timely development has been flame-retarding paint and coatings for tents, tarpaulins, gun and truck covers, camouflage nets, etc. Chlorine helps make these paints.



Chemical Warfare

The versatility of Chlorine is demonstrated by the fact that it is required in all war gases—yet is the best agent for decontamination of materials, etc., exposed to these gases.



Essential for industrial mobilization, too

All along the industrial front, Diamond Chlorine serves in many vital roles. It helps bleach and refine the pulp needed for blueprint and other papers—and for explosives! In the manufacture of the plastics now used in place of more critical materials, Diamond Chlorine is used. It refines metals and alloys—helps keep power plants running by eliminating algae and impurities that reduce the efficiency of condensers and other units.

Never before have the dependable uniformity and purity of Diamond Chlorine been of greater value than today!

ALKALI

DIAMOND ALKALI COMPANY

PITTSBURGH, PA., *and Everywhere*

PLANT OPERATIONS NOTEBOOK

by W. F. SCHAPHORST

Think Twice Before Cleaning Belts With Steam

Steam is an excellent cleanser for many purposes and for that reason it is often thoughtlessly turned on to a power transmission belt, and as a result the belt may be utterly ruined. The utmost caution must always be exercised in the use of steam for cleaning belting. Many kinds of belting cannot withstand the high temperatures that go with steam. The temperature of steam at atmospheric pressure is 212° F. The higher the steam pressure the higher the corresponding temperature as may be determined by consulting any steam table.

212° F. is too hot for most rubber belting. One prominent rubber belt manufacturer states that his belting is not affected by heat up to a temperature of 200° F. He states that where higher temperatures are to be encountered he should first be consulted. That is good advice regardless of the kind of belt. Even where steel chains are used one must be careful in high temperatures or lubrication difficulties may be experienced. To be sure steel chains can be cleaned safely with ordinary steam, but be sure the steam is not "superheated."

Balata belting is more sensitive to high temperatures than rubber. Its temperature should be kept down to less than 110° F. At 125° balata gum can be moulded.

According to one well known authority on the subject oak tanned leather belting should not be subjected to a temperature higher than 115° F., which means, of course, that oak belting should *never* be cleaned with steam. It can't stand it.

Next comes cotton belting. Cotton can stand the temperature of steam, but impregnated cotton belting should not be cleaned with steam because the steam will very likely wash out the impregnating compound. Without the compound, cotton belting does not give satisfactory results. Stitched canvas belting should not be used in temperatures higher than 140° F.

This, as you will therefore see, does not leave many types of belts that *can* be steam cleaned with safety. As stated in the first paragraph the utmost caution must always be exercised in this connection. Be sure that it is a first class belt, capable of resisting the high temperature before you turn the steam hose on it.

Welding Position

Welding in modern manufacturing plants has brought about the creation of a new and valuable machine called the "Positioner" by some and the "Manipulator" by others. Chemical plant operators should know about it. It is a sort of gigantic lathe face plate adjustable to any angle and to which face plate the work is fastened whether it be a portion of a tank, airplane, gun, ship, or what not. By means of this positioner the work is rotated around to any position most convenient to the welder. It is an important time, energy, and back saver. In addition to saving considerable money for the operator or manufacturer it assures better welding.

So in doing welding and other jobs in and around the chemical plant, and particularly when laying new pipe lines, the principles of the positioner can sometimes be advantageously copied. Take for example a pipe line, as indicated in the sketch below. The thing to do is to turn or "position" as much of the piping as possible when welding or even when bolting the joints so that the work can be performed conveniently from above. Don't "get under" at every joint, as is so commonly done. Thus let us say that you are welding from the right and toward the left. The piece of pipe at the extreme right is rigid and cannot be turned. Do not weld the joint marked "Last." First weld 1, then 2, then 3, 4, 5, etc. and "position" the work by turning the pipe. When you have handled as many joints in this manner as is practicable, then weld the joint marked "Last."

Where pipe runs are long and straight nearly all of the joints can be positioned in this manner. However, even where terrain is difficult and where there are a great many bends and variable grades it is well worth while to bear this "positioning method" in mind. As already stated, the positioner is a great time, energy, back, and money saver. It is one of the creations of the war that is "going over." You may not need one for your plant but you can well afford to imitate it.

How to Bend Small Pipes and Tubes

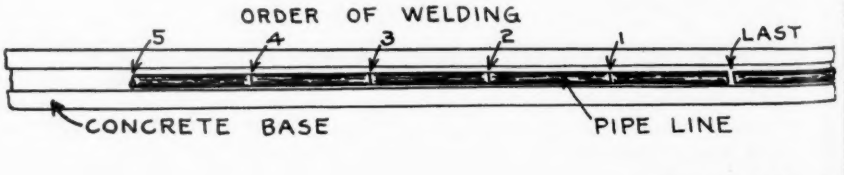
More has been written about bending large pipes than small pipes, probably because the bending of a large pipe is regarded as more difficult. Fill with dry sand and plug the ends. Heat to a red heat in the locality to be bent and then bend. Be sure that the sand is dry. Where bends are slight, it is often unnecessary to use sand. The object of sand is simply to keep the sides of the pipe from collapsing, or to prevent reduction of flow area. If wet sand is used and if the ends are plugged, the pipe may burst when heated due to the steam pressure generated.

In bending smaller pipes and tubes, resin is a good substitute for sand. There is, however, a "right way" and possibly several wrong ways in which to use resin. An example of a wrong way was recently brought to this writer's attention in which the mechanic filled the pipe with resin, plugged the ends, and heated the pipe at the place where he wanted to bend it. He watched for a "red heat" just as he would had he filled the pipe with sand. The result was—a violent explosion.

Don't do it that way. When using resin, pour it into the pipe and allow it to cool and harden. When the resin is hard, bend the pipe cold. Don't heat it. Then after the pipe is bent, heat the pipe all over sufficiently to melt and remove the resin.

Or, if you have enough lead available, lead may be used instead of resin. It is said that on cold days in far northern countries they sometimes fill the pipe with water, let it freeze, and then bend the pipe. It sounds plausible, but care must be exercised with water on account of its expansion when it freezes.

Copper pipes and tubes are bent in the same way. Pitch, resin, paraffin wax, lead, babbitt, and even tin are sometimes used, but some of these materials are often objectionable because they adhere stubbornly to the interior of the pipe and are removed with great difficulty. If these materials are left in the pipe they may form restrictions and interfere with the flow of fluids. In copper pipes paraffin wax is least likely to adhere. To prevent adherence of soft metals such as lead, tin, or babbitt metal, prepare a "plumber's smudge" which consists of a thin mixture of glue and water—about a half pint—



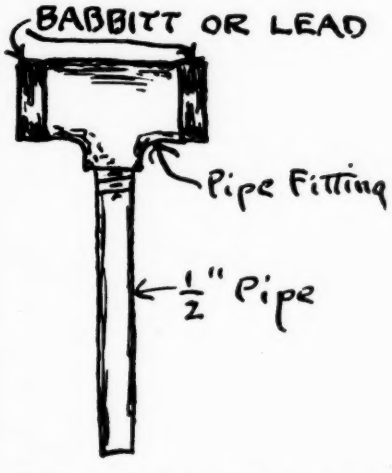
and a tablespoon of lamp black. Boil the mixture, and completely fill the pipe with it. Then promptly empty the pipe. Then thoroughly dry the interior of the pipe by heating. To such a treated interior soft metals, including even solder, will not adhere.

There are many excellent devices on the market for bending pipe. To bend a large, stiff pipe, slightly and inexpensively, there is nothing handier or more efficient, in this writer's judgment, than a hydraulic pipe bender driven by a hand pump. For large-scale bending, use power drive.

Soft Hammer

A useful and easily made soft hammer for use in and around the chemical plant is shown in the accompanying sketch. It is nothing more or less than an ordinary standard "Tee" pipe fitting and a half inch pipe. The former, when filled with lead or babbitt metal, serves as the hammer head, while the latter serves as the handle.

To pour the metal, moulds are unnecessary. Simply wrap paper around the rim to form the face of the hammer and to keep the lead from spilling when the metal is poured. Nor is it necessary to fill the Tee entirely full of molten metal; it may be filled mostly with pieces of scrap metal or anything non-combustible to fill the space. Scrap pipe plugs, for instance, are excellent fillers.



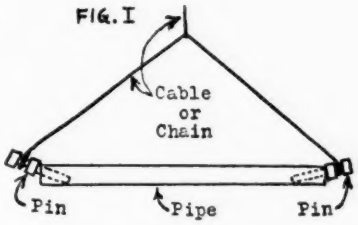
This type of hammer can be made in almost any desired weight because there are so many standard sizes of pipe fittings. The one this writer made weighed about four pounds.

As every chemical plant operator knows, for striking and driving bolts, nuts, shafts, pipe, and similar machinery parts that must not be scratched or battered there is nothing better than soft lead or similar soft metal for the face of the hammer. Rawhide-faced hammers and wooden hammers do not scratch or batter, but they often are not heavy enough for the quick and positive performance demanded by most chemical plant mechanics and operators.

Protect Pipe Threads

When handling heavy pipe or similar chemical plant equipment mechanically, a common method is to use steel hooks on the ends of the cable, chain, or rope. These hooks are hooked into the ends of the pipe, or into any convenient opening, often resulting in battered threads. If the pipe is provided with couplings the internal threads of the couplings are almost certain to be battered to some extent, and even where the threads are external they are frequently damaged.

Because of the battered threads considerable extra time is consumed by the pipe fitters in making things right, or in forcing the fits. In fact, damaged pipe threads of this type may result in leakage, for reasons that every chemical plant man knows.



The accompanying sketch, Fig. 1, shows how to avoid this battering. Two hard wood pins, turned as indicated in the detail sketch, Fig. 2, will prevent metal from coming in contact with the threads. Simply insert the ends of the pins into the pipe as shown in Fig. 1 and let the hoist do the rest. This method is just as quick as with metal hooks, and is certainly far preferable.

Of course this "pin method" is not applicable to all heavy chemical equipment, but it is hoped that this kink will prove helpful in suggesting solutions for other handling problems involving thread protection.

Welding Aid

Noviweld-Didymium lenses for flame welders are now available in a No. 3 shade, according to an announcement by American Optical Company. With the addition of this lighter shade, which is particularly useful for welders working on aluminum, Noviweld—Didymium is now available in four shades: 3, 4, 5 and 6.

The concern states that lenses made from this glass absorb sodium flare, thus enabling flame welders to see working areas more clearly. In addition, the glass protects eyes against both ultra-violet and infra-red radiation. Ground and polished to ophthalmic standards, the lenses preserve orange and red color values so that welders can see the red hot bead and the molten metal in brilliant colors.

The lenses, adds the concern, can improve the efficiency of welders and the smoothness of their welds.

Fire Extinguisher Labels

A recent note from the Safety Research Institute, Inc. calls our attention to the fact that there is a certain amount of confusion concerning the distinction between fire extinguishers bearing standard Underwriters' Laboratories approval and those bearing the Laboratories "EAS" approval In this connection the following information, supplied by the institute, may be helpful.

Standard approved extinguishers bear the usual Underwriters' Laboratories label, which reads "Underwriters' Laboratories Inspected," and gives the serial number of the label and pertinent information on the classification of the extinguisher. That label signifies that the unit conforms to the Laboratories' "prewar" specifications covering types of materials, details of construction, performance requirements, etc. Such extinguishers are now available only to very high priority holders.

When war started, restrictions on the use of critical materials made it necessary for the manufacturers of standard extinguishers to develop new models using non-critical materials. The solution to this problem was undertaken in cooperation with Underwriters' Laboratories, and a realistic decision was made to sacrifice durability in favor of performance.

"*Emergency Alternate Specifications*" were developed which permit the use of substitute materials, and extinguishers produced under these specifications bear an "*EAS*" approval label—that is, the Underwriters' Laboratories inspection label has the letters "EAS" added and also the year of manufacture.

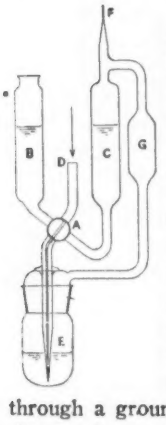
Translated into practical terms, this label signifies that the unit on which it appears will perform as well as the standard model, but will require more careful maintenance and cannot be expected to resist corrosion or stand up as long as the standard type. When standard equipment is once more obtainable, the "*EAS*" approval will be withdrawn. "EAS" extinguishers now available include pump tank and foam types. Many of these are going to priority holders, but some are being released to the general public.

Both labels are intended as indications to insurance inspectors of the degree of protection the equipment affords an occupancy. They serve as comparable indications of reliability to the owner or prospective purchaser of fire fighting equipment.

LABORATORY NOTEBOOK

Observing Rapid Chemical Reactions in Solution

An apparatus that should find useful application in kinetic studies whenever it is possible to follow a reaction by direct titration *in situ*, is described by E. O. Powell and J. H. Trendall in *Chemistry and Industry*. The principle of the device consists in adding to the reaction mixture, containing an indicator, small constant amounts of a standard solution determined by the bore of a tap.



In the figure A is a four-way tap whose key has a single straight bore of which the volume is of the order of 0.02 cc. Two arms are connected to reservoirs B and C for standard reagent, D is supplied with air under a few inches water pressure (*e.g.*, from a filter-pump-aspirator blower) and the remaining arm, of capillary bore, passes through a ground joint to the bottom of the reaction vessel E. A lead from the top of the latter communicates via a bulb G with the top of reservoir C, which is provided with an air leak at F.

With the bore of the tap as shown, air bubbles through the solution in E, stirring it, and escapes at F, which is fine enough to ensure an appreciable rise in pressure in C. When now the tap is turned through a right angle, its bore is cleared of air by a flow of liquid from C to B. Then as the excess pressure is relieved by the leak F, the level in the reservoirs is restored after a few seconds. The bore is now charged and its contents are driven into E. Bulb G serves to increase the air capacity when the reservoirs are full.

Concerning the glass work, the bore of the tap should register fairly accurately with the holes in the barrel, and in particular should meet the surface of the key in sharp edges. Also, the drainage error is minimised by keeping the tube leading from A into E undistorted at the internal seal. This is done by forming a short tube on the cover of the reaction vessel which is a close fit over the leading-in tube. The latter need not then be blown when the two are fused together.

Calibration of the tap and reagent together can be carried out by titrating a quantity of a suitable known standard solution in the reaction vessel. A little of the standard is put into the latter and brought to its end-point, to avoid initial drainage error, then an exactly measured volume. The accuracy of the estimation will depend on the number of turns of the tap required to neutralise this amount, the equivalent of half a turn can be estimated, and after the standardization has been carried out for the first time the quantity of solution to be titrated can be judged according to the precision desired. Always keep the tap open to the reaction vessel for three or four seconds.

In carrying out an experimental run the same drainage period must be adhered to. The components of the reaction, with the indicator, are mixed in the vessel E which is then immediately attached to the upper part of the apparatus; an addition of standard reagent is made and when the indicator changes the time is noted and a further addition made. This cycle of operations can, if necessary, be repeated up to about ten times a minute; thus quite rapid reactions can be followed comparatively easily. The concentration of the standard reagent is adjusted according to the speed of the reaction under investigation, the degree of completeness to which it is desired to follow it, and the amount and concentration of the reaction mixture. The large number of point data obtained will determine a velocity constant, or serve to test the law corresponding to an hypothetical mechanism.

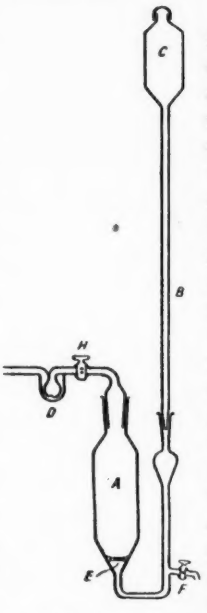
Cleaning Baths

Even with the use of abrasive soaps, dichromate cleaning solution and solutions of trisodium phosphate, it is difficult to keep laboratory apparatus clean, especially semi-micro apparatus such as small test tubes, funnels, crucibles, flasks, short lengths of glass rod, glass tubing, etc. Otha K. Coleman, School of Pharmacy, University of Georgia, describes an aid to the solution of this problem in *The Chemist Analyst*. Place these pieces of apparatus, as they become dirty, in an appropriately-sized refrigerator dish (9″ long, 4″ wide, 3″ deep), covered with a tightly-fitting lid and partly filled with recovered alcohol or some other suitable organic solvent or combination of solvents. (It is desirable to keep this dish near the sink where it can serve as a convenient depository for waste solvents.)

The apparatus is removed periodically from the solvent bath and placed in a solution of trisodium phosphate. It is kept there overnight or for a longer period, depending on the length of time required to clean it. The apparatus is then removed from this bath and rinsed, after which it may often be drained clean or at the most requires only a minimum of scrubbing.

Gas Generator

When used for the occasional preparation of gases such as carbon dioxide, hydrogen sulfide, or hydrogen, the generator discussed by J. A. Muller in *Chemische Fabrik* has advantages over the more conventional type. To illustrate its use, Mr. Muller described the preparation of air-free carbon dioxide for micro-nitrogen estimations.



The apparatus is first cleaned with chromic acid mixture, a layer of boiled-out marble-chips placed on the porous porcelain plate *E*, and the stopper carrying the tap *H* and bubbler *D* put in position. With *H* closed, a mixture of equal volumes of concentrated hydrochloric acid and distilled water is poured into the apparatus via *C*, till the latter is approximately one-third full. Gas is evolved, after opening *H*, when the acid comes in contact with the marble. In order to effect rapid removal of air from *A*, the tap *H* should be fully opened for a short while, care being taken to close it slowly, so that the vigorous gas evolution does not blow acid from *C*. The apparatus is now ready for use.

After some time, a gradually increasing amount of spent acid accumulates in *A*. To discard it without loss of un-used acid, the tap *H* is fully opened for a brief period and then closed. Fresh acid thus comes in contact with the marble and a vigorous gas evolution forces all the liquid from *A* into *B* and *C*. The tap *F* is then opened so that only the spent liquor is drawn off. This liquor, which contains a high proportion of calcium chloride, is used to make up fresh acid for refilling the generator, because air is less soluble in calcium chloride solutions than in water.

The tap *F* may also be used as a safety device. Should a too violent reaction occur in *A*, with consequent risk of blowing acid from *C*, the pressure may be released by drawing off liquid. When the apparatus is no longer in use, the acid may be drained from *F*; the tube between *E* and *F* remains full of liquid and prevents access of air to the gas-chamber *A*.

INDUSTRY'S BOOKSHELF

Chemistry Over the Top

THE CHEMICAL FRONT, by *Williams Haynes*. Alfred A. Knopf, Inc., N. Y.; 1943, 264 pp., $3.00. Reviewed by *Robert L. Taylor*, editor, CHEMICAL INDUSTRIES.

IN THE MANNER of the four blind men describing the elephant, various people have described the present war as a mechanical war, an air war, a communications war, a medical war, a war of materials, a propaganda war, and several other kinds of war. Mr. Haynes has foregone the obvious and no doubt tempting urge to add to this array a chemical war. He has contented himself with modestly using the phrase, "an ultra-mechanized war being fought from a chemical base." Similar constraint has been exercised throughout in the preparation of this informative and highly readable account of chemistry's contributions to the winning of United Nations' victories from Stalingrad to Bougainville.

While it will require several years and the lifting of secrecy orders before the whole story of the chemical accomplishments behind this war can be told, Mr. Haynes has nevertheless succeeded in bringing together a considerable amount of information for so early a volume. The fact that much of it is historical and background material does not detract from its interest.

This reviewer was especially pleased to find tucked away among deservedly more elaborate descriptions of such noteworthy developments as synthetic rubber, aviation gasoline, sulfa drugs and magnesium, a number of lesser publicized but nonetheless interesting smaller-scale achievements such as American Cyanamid's design and construction of a 50-ton a day nitroguanidine plant from scratch based on a sample of the material from an English pilot plant, D. & L. Slade's and A. D. Little's formulation of a synthetic cinnamon to ease the shortage caused by Japanese occupation of Indo-China and the Netherlands Indies, and the winning of the Army's own little private war on insects through the aid of a whole battery of high powered industrial chemical laboratories.

It is only unfortunate that a book otherwise so well done should be marred by several rather prominent errors of fact, such as in the chapter on RDX, the superexplosive developed commercially in Canada. Aside from this criticism, the book can be recommended as fascinating reading for chemical and lay readers alike.

Application of Mathematics

THE MATHEMATICS OF PHYSICS AND CHEMISTRY, by *Henry Morgenau and George M. Murphy*. D. Van Nostrand Company, Inc., N. Y.; 1943, 581 pp., $6.50. Reviewed by *Prof. Charles O. Beckman*, Department of Chemistry, Columbia University.

AT THIS DATE one need not belabor the thesis that mathematics is a tool of prime importance for the chemist and chemical engineer. One can go directly to the problem of acquiring sufficient knowledge of the subject and of putting it to use. Practically all the mathematics one needs is already in book form. A student of chemistry or chemical engineering might, of course, study these books but not without a sacrifice of the study of the subject of his main interest. One can become so completely involved in mathematical proofs that sight of physical application is lost.

The problem of using mathematics essentially involves using the books which have been studied at an earlier time. However, it is seldom the case that one uses more than a few sections of any one of the more extensive treatises on mathematics. A single volume containing these essential sections is obviously highly desirable.

In the opinion of this reviewer, the authors of this book have succeeded in solving these problems almost completely. Their own extensive original work in theoretical physics and chemistry has equipped them with the judgment necessary to select the proper subject matter and although one may disagree with their choice in a few isolated instances, one must agree that they have covered the essentials of the mathematics that are needed by the modern physicist and chemist (and chemical engineers). By using the same language for mathematically related problems, they have emphasized the unity of the method and made it easier to apply to problems as yet unsolved.

As a textbook, this volume may be used as an introduction to the mathematics of the three basic subjects of physics and chemistry, namely, thermodynamics, statistical mechanics and quantum mechanics. The problems of polyatomic molecules, liquid and solid state are treated as well.

As a reference book, one will find it extremely useful. In addition to the previously mentioned topics, one will find sections on differential equations, vector analysis, matrix algebra, group theory, linear integral equations and numerical calculations that are remarkable for their clarity and conciseness.

Pigment Reference

PROTECTIVE AND DECORATIVE COATINGS, Vol. II, by *Joseph Mattiello*. John Wiley & Sons, Inc., N. Y.; 1943, 658 pp., $6.00. Reviewed by *William L. Hale*, chief chemist, Debevoise Paint Co.

VOLUME II, like Volume I, has been written by recognized authorities, the list of which reads like the "Who's Who" in the paint industry. It is an up-to-the-minute survey of the present pigments, metallic powders and metallic soaps, as used in paints, lacquers and inks.

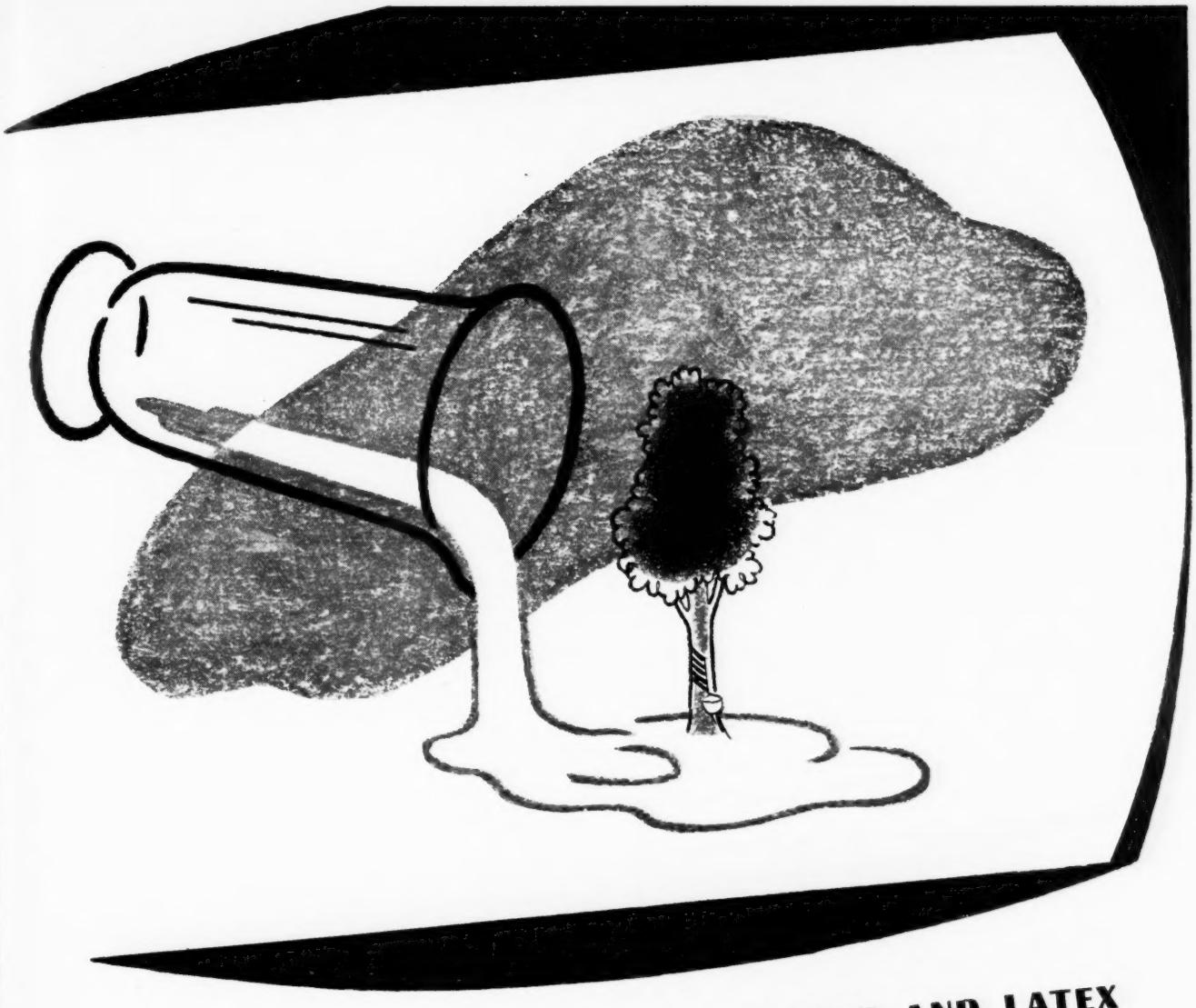
The first chapter classifies all pigments as to composition and hue, and briefly describes manufacturing procedures and methods of identification. The chemistry of synthetic organic pigments is given in Chapter II, along with the many formulae in the complex reactions for producing the various colored pigments.

Chapter III, The Microscopic Identification of Azo Dyes and Organic Pigments, contains an interesting collection of photomicrographs and a description of the new method and technique used. Dr. Lincoln T. Work has a chapter on the measurement of particle size of pigments and fillers. The remaining twenty-three chapters cover the various pigments with detailed information as to origin, composition, physical and chemical properties. Those chapters on organic dyes are beyond those who are not actually in this particular branch of the industry. There are many useful tables, photomicrographs, and suggested formulae.

In no other way could a technical book, covering so many pigments, be of such value as when written by many men, all specialists in their particular field. The paint, varnish, lacquer and ink industries have grown greatly and will continue to expand, particularly along scientific lines. There are suggestions as to what may be expected in future. This text may be used as a constant reference.

The book is well written and is particularly useful because of the application of the data given as to the properties of pigments such as specific gravity, bulking, oil absorption, hiding power, particle size and in addition, the suitable Government specification number is included.

Much of the information given is available in various papers that have been given at technical meetings or published in magazine articles, but the value of this volume is in having it all available in one book. It is the kind of book that can be used not only by the research department but also by the executive and sales departments.



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BOOKLETS & CATALOGS

Chemicals

A598. EXECUTIVE TRAINING. "How to Prepare an Engineering Report," "Methods for Waste Reduction," and "Controlling the Cost of Maintenance Work" are now available from the Alexander Hamilton Institute, Inc.

LUMINESCENT PIGMENTS.—The physical characteristics of phosphorescent, fluorescent and radium active pigments are listed in a new catalog of Violite pigments. Definitions of technical terms used to describe luminescence complete the handy booklet, which may be obtained by requesting it upon company stationery. Rhode Island Labs., Inc., 100 Pulaski Street, West Warwick, R. I.

A599. PERFUME COMPOUNDS AND SPECIALTIES for the cosmetic and allied industries are priced in list P. Among the products included are flavors for dentifrices, deodorants for various materials, fixatives, perfumes for fly sprays, perfume compounds and bases, gun screens, and technical perfumes. Schimmel & Co., Inc.

A600. PRODUCTION MANAGEMENT. This booklet outlines production management methods for improving utilization of manpower resources and plant facilities through cooperation between management and labor. Work measurement and production control, method improvement, labor cost and expense control, supervision and indirect labor, planning and scheduling, job evaluation, incentive wage plans, and other phases of plant operation are discussed. Bedaux Co., Inc.

A601. SOAP IN LUBRICANTS to assist in war production of cold-fabricated metals is discussed in a 4-page memorandum, explaining its use in reducing friction in metal drawing, its saving of copper by eliminating need for copper plating, and its improving oil film strength particularly in those lubricants that come in contact with gasoline. Ass'n. of American Soap and Glycerine Products, Inc.

A602. "STEEL FOR VICTORY," November issue, carries an interesting photographic story of quality control throughout the various steps of manufacturing steel. American Iron and Steel Institute.

Equipment—Containers

F17. COLLOIDAL FUEL MILLS for mixtures including the publicized coal-oil fuel subject the constituents to temperature of fluidity, pressure for capacity, positive explosion of particles, high velocity particle impact, hydraulic shear that breaks up liquid into smaller globules, and mechanical shear of particles by teeth in rotor and stator. Schematic diagrams and photographs illustrate Catalog No. 431.

F18. COMMUNICATION SYSTEMS for two-way private or amplified communication for office, factory, and institutional use are described in illustrated folder. A catalog-survey chart helps the executive analyze his communication requirements. Executone, Inc.

F19. ELECTRIC FURNACES for providing controlled, precision heat-treatment are discussed in detail in a new 82-page catalog, GEA-4049. Profusely illustrated, the bulletin describes the many types of electric furnaces made by the company, indicates the applications for which each type is most suitable, and presents outline drawings showing construction details of furnaces typical of those described. Complete with descriptions and illustrations of standard and special control equipment for the furnaces. General Electric Company.

F20. EQUIPMENT FOR WATER, Sewage and Industrial Waste Treatment Plants is described in attractive 40-page Catalog 775. Covered in detail are bar and disc type screens, screenings grinders, grit collectors, grit washers, sludge collectors for primary and final settling tanks, sludge elevators, floctrols, scum removers, dry feed chemical machines, equipment for biofiltration plants, garbage grinders, belt and spiral conveyors, bucket elevators, chains and sprockets, and transmission machinery. Illustrated with photographs and dimension diagrams of the apparatus. The Jeffrey Mfg. Co.

F21. HEAT-TREATING ATMOSPHERE. Providing nine variations of gases from which the proper atmosphere for any heat-treating process may be selected, these four basic atmospheres (Endogas, Exogas, Monogas and Ammogas) meet requirements of annealing, brazing, hardening, tempering, gas carburizing, sintering, and normalizing. New 16-page Booklet B-3251 explains the chemical reaction, composition cost, application and equipment needed for each atmosphere. Use of correct atmosphere is said to cut down processing time, reduce machining before and after heat treating. Illustrated with photographs of typical furnace applications, and schematic arrangement and flow diagrams for endogas generator, carbon dioxide remover for monogas, and ammonia dissociator. Charts permit quick selection of atmosphere and equipment. Westinghouse Electric and Mfg. Co.

F22. INDUSTRIAL REFRIGERATION AND AIR-CONDITIONING EQUIPMENT is treated concisely in a 4-page bulletin describing the features, advantages, and capacities and listing applications for G-E condensing units, heat transfer assemblies, cooling and heating coils, condensers and coolers, and industrial conditioners. The chief applications made are those for Al and Mg storage, low temperature testing cabinets, blood and plasma preservation, photographic film and paper, air blast heating and drying systems, process air conditioning, steam-heated curing ovens, industrial air conditioning dehumidification, and photographic processing. General Electric Co.

F23. MILLING EQUIPMENT. Of interest to processors, this bulletin pictures and describes pressure and diaphragm pumps, thickeners for continuous thickening and dewatering of pulp, agitators and conditioning agitators, screw classifiers for materials in wet grinding processes, desliming, dewatering, washing, and sizing, and hydro-separators for the separation of pulp into a coarse and fine fraction. Western Machinery Co.

F24. OIL PURIFIERS. A new illustrated folder describes lubricating and hydraulic oil reclaimers valuable to anyone with a problem in oil reclaiming. Youngstown-Miller Co.

F25. PIPE AND TUBE BENDING HANDBOOK is an exceptionally thorough, well-organized manual which includes illustrations, and drawing plans of practical methods for bending pipe and tubes of copper, brass, and related alloys. Tables include data on physical properties of copper, chemical and physical properties of important pipe and tube alloys, standard pipe sizes of brass, red-brass, and copper pipe, bore, surface areas, and bursting pressure of copper tube, and weights of seamless tubes with explanations for their use. Copper and Brass Research Ass'n.

F26. POTS, PANS, AND BOXES for carburizing, annealing and hardening, available in many patterns—small, medium, large; round, oblong, square; shallow or deep—are briefly described and illustrated with photographs in the August issue of *The Amsco Bulletin*. American Brake Shoe Co.

F27. PRESSURE-TREATED WOOD. Uses of pressure-treated lumber in construction and in industry are discussed in a well-illustrated guide book for material selection for engineers, architects, contractors, builders and maintenance supervisors. The processes for treating lumber for protection against decay, fire, acid, termites, and marine borers are explained and the engineering services which the company offers in determining the treatment of lumber to assure permanence

under severe conditions are outlined. Koppers Co.

F28. PUMPS. The use of Peerless pumps on war fronts with every type of use in the Army and Navy is shown in a new well-organized booklet attractively illustrated with photographs from official military sources. Food Machinery Corp.

F29. PUMPS. Raising water from deep wells by means of the turbine and by hypocycloidal are described in Bulletin 141A. Cross-sectional views of deep well pumps reveal the shafting and submerged pump elements graphically. To illustrate the application of power for direct motor connection, belted drives, geared power and combinations of these, several types of pump heads are shown. Peerless Pump Co.

F30. PUMPS. Positive displacement proportioning chemical pumps, both manual and automatic, for high and low pressures, are described and illustrated in Bulletin No. 44-D. Wilson Chemical Feeders, Inc.

F31. RUBBER POURING BUCKETS. A new catalog section on Flexite line of rubber buckets, describing also rubber dippers, funnels, and anode acid rubber gloves has been issued, with special emphasis on a rubber bucket developed for arsenals and shell loading plants. The B. F. Goodrich Co.

F32. SAFETY. A new booklet describes the line of C-O-Two portable and built-in carbon dioxide fire extinguishing equipment and smoke-detecting systems. Application and operation of various types of extinguisher equipment are described. C-O-Two Fire Equipment Company.

F33. SANITATION EQUIPMENT. Clarifiers and digesters are pictured and discussed in a new 8-page Bulletin No. 35-B. Hardinge Co.

F34. "SECTIONAL HAIRPIN" HEAT EXCHANGERS are described in a 6-page bulletin explaining the "non-removable" rear and assembly permitting quick inspection and cleaning, and the easily assembled "head seal," and giving dimensions of standard sizes, performance data, and explanation of design, and structural features of interest to engineers, works managers, and superintendents. The Brown Fintube Co.

F35. SEPARATION OF LIQUID FROM GASEOUS MEDIUM. Steam purifiers are discussed in 12-page Bulletin No. 1929. Schematic diagrams and dimension tables for Pipe Line, Drum Types, and "O-F" type Tracyfiers are included. Blaw-Knox Div., Blaw-Knox Co.

F36. STAINLESS STEEL FLEXIBLE TUBING AND BELLOWS. A well-illustrated engineering manual discusses characteristics of this product with tables of sizes, weights, wall thicknesses of various wall forms, data on fittings with diagrams and instructions for attaching fittings, and design procedure for types of applications. A doublespread page giving line-loss data in chart form of rex-flex tubing and elbows is featured. Chicago Metal Hose.

STEATITE PARTS. Detailed and dimensional drawings of standard pressed steatite parts including bushings, trimmer-condenser bodies, terminal strips, tube sockets, tube parts, coil bases, variable-condenser end pieces, oscillating-crystal cases, are listed in the Crolite Pressed Steatite catalog. A copy of the bulletin is available to firms designing or producing equipment utilizing steatite and requesting the booklet on a business letterhead. Henry L. Crowley & Co., 1 Central Ave., West Orange, N. J.

F37. STEEL. New catalog on Stainless-Steel gives information on analyses, applications, manufacture, fabrication, styles of heads and standard size of sheets and plates. Also explains the patented "assembly method" used to produce this steel. Of special interest to fabricators are the sections on deep drawing, grinding polishing, cleaning, gas-cutting, riveting, soldering, and welding. Jessop Steel Co.

F38. TRUCKS. The "Lift Truck Operators Guide" gives operating instructions in simplified form for starting, shifting gears, steering. lifting and tilting. Charts give a visual picture of the control for each operation. Simple illustrations emphasize typical load-carrying devices and methods of stacking. Safe, space-saving methods of building unit loads are shown in pictorial form. Check lists of do's and don't's cover safety and operating care of the lift truck. Towmotor Corp.

F39. TUBE MILLS. Pebble tube, ball tube, and compartment mills are the subject of Bulletin No. 18-A. Details on the "electric ear" method of automatic feed, on the construction of heads, shell, bearings, countershafts, gears and pinions, and discharge diaphragms, on the various types of feeders, linings, classifiers, and balls and pebbles are covered. Photographs of the equipment illustrate the booklet. Hardinge Co., Inc.

F40. VALVE OPERATORS, Type 303, for regulation of temperature, pressure, flow or level between two adjustable positions are reported in Catalog A8. Contains engineering information, design features, and operating data. Illustrated with photographs and wiring diagrams. Automatic Temperature Control Co., Inc.

F41. VIBRATING EQUIPMENT. Catalog 750 describes the basic design, operating principles, and common applications of electrical equipment for feeding, conveying, cooling, drying, packing, and screening. Equipment covered includes feeders, waytrols, bin valves, conveyors, dryers, coolers, packers, and screens. This attractive 172-page booklet also contains blueprints, photographs, technical graphs, and tables. The Jeffrey Mfg. Co.

F42. WATER TREATMENT. This article describes two classifications of chemical feed systems in the treatment of water or sewage; one, which introduces the chemical in dry form with the various types of dry feeders or in solution form with the type of feeder designed for this service, and the second, which deals with the rate of either a constant or a proportional feed system.

F43. WELDED HEAT EXCHANGER AND CONDENSER TUBING. Photographs in a chart form show the symbols of all companies who manufacture welded steel tubing for heat transfer apparatus and who have adopted the procedure of identifying the tubing as having been manufactured specifically for this application. Formed Steel Tube Institute.

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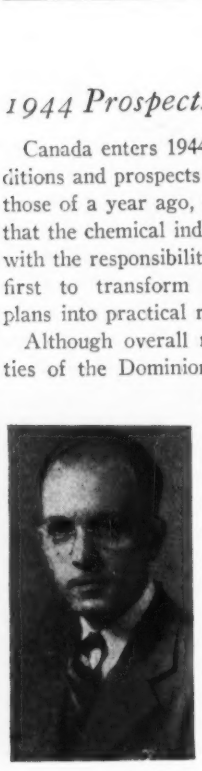
CANADIAN REVIEW

by W. A. JORDAN

1944 Prospects

Canada enters 1944 with industrial conditions and prospects vastly different from those of a year ago, and it is now evident that the chemical industry will be charged with the responsibility of being among the first to transform academic "postwar" plans into practical realities.

Although overall manufacturing activities of the Dominion are at an unprecedented high level, with 1943 output of war goods up 37 per cent over 1942 to stand at 2.8 billion dollars, a downward revision in small arms and explosive needs is being reflected in reduced output by war engendered chemicals and explosives producers.



W. A. Jordan

A year ago most of these chemical units were just coming into full scale production, and all out efforts were necessary for the first half of the year to meet immediate needs and build up reserves. During the second half of 1943 tapering demand permitted an easing of productive operations.

Just what function many of these Crown plants will perform in the future is still an open, $140 million question. A number, of rather temporary construction, will undoubtedly close. Other units, of a more permanent, compact, and adaptable nature, will be disposed of to private interests by the newly formed War Assets Corporation.

It is anticipated that concrete evidence of the Government's policy in connection with future disposition of its industrial holdings will evolve when the Federal House convenes late this month.

1943 Chemicals Production

Production of chemicals and explosives by Government-owned, privately managed, war plants, was evaluated at $152 million during 1943 according to an official preliminary compilation. This valuation, which includes the cost of shell filling but not that of shell cases or other components, represents an increased output of $24 million over 1942, and is $102 million greater than 1941. Tonnage production at 500,000 was up 70,000 tons over the preceding year.

Complete statistics of the entire Canadian chemical and allied industries will not be available for some months, but it is probable that 1943 output will approximate $515 million to establish an all time high for the industry.

Barytes, Fluorspar from Maritimes Increase

A recent announcement by the Bureau of Mines points up the increased emphasis which has been placed on the production of chemical raw materials in the largely non-industrialized Maritimes.

The outstanding phase of this development which has taken place since the outbreak of war is the exploitation of the Walton barytes deposits. This mine, first worked in 1940, has yielded 20,000 tons of barytes during 1943, or nearly 50 per cent more than in the preceding year. The character of the ore is such that it is suitable primarily only for use by oil producers, and as a result virtually the entire mine output is exported to Trinidad.

A second enterprise which is expanding apace, the Lake Ainslie Mines, has attained a new production peak of 1000 tons of fluorspar during 1943, most of which has been shipped to Ontario steel-making operations.

Other recent developments in the same provinces include the creation of a 250-ton diatomite producer, and additional investigations are being conducted on salt and salt-potash deposits.

Oil-Bearing Seed Crop Sets New Record

Preliminary reports indicate that Canada's 1943 production of oil-bearing seeds will exceed all previous records, in spite of unusually low per acre flaxseed yields.

The year's crop of flaxseed totalled 17.7 million bushels, or ten times the average for the 1936-40 period. The soybean crop amounted to 909,750 bushels, up 700,000 bushels over prewar figures. Sunflower seed output was 18.6 million pounds and rapeseed 3.4 million pounds. Neither of the last mentioned was a commercial crop prior to the war.

The Government has established even higher goals for 1944 with flaxseed acreage quota to be increased 10 per cent, soybeans 9 per cent, sunflower seed 72 per cent, and rapeseed 147 per cent.

Funds Requested for Coal Hydrogenation Research

The Department of Mines and Resources has recommended to the Government that some $400,000 be made available immediately to construct a combined laboratory and pilot plant for more intensive investigation of hydrogenation processes for the production of gasoline and liquid fuels.

This department has conducted experiments on domestic lignite, bituminous coal, etc., since 1929, but the apparently imminent shortage of petroleum renders the intensification of these investigations imperative. The last figures published on Canadian petroleum consumption, for 1941, revealed that 47 per cent of the 58 million barrel total was imported from the U. S. A. and only 17 per cent came from Canada.

It is stated that initial research will be centred on Alberta bitumen, in view of the fact that small scale experiments have resulted in a rather encouraging 194 imperial gallon per ton yield. Subsequently further attention will be devoted to bituminous coal, lignite, and natural gas.

Although Canada has bounteous supplies of lignite, work to date indicates that, regardless of ready liquefaction, oil yields are low because large quantities of gaseous hydrocarbons and water are formed. On the "as mined" basis the two lignites tested, from Saskatchewan and Ontario, yielded only 68 and 50 gallons of gasoline per ton of lignite processed.

New Vegetable Oil Plant

A $2.5 million plant is to be erected on the Toronto waterfront for the extraction and processing of vegetable oils, and it is understood that this unit will be capable of handling some 2.5 million bushels of oil-producing material annually. Although detailed plans have not as yet been completed, officials state that the plant will be producing edible oils from flaxseed, soybeans, sunflower, and rapeseed by midsummer.

This installation will bring the Dominion's oil expelling capacity to a record 9 million bushel peak, and for the first time Canada will approach self-sufficiency in this respect.

Our Error

On page 841 of Mr. Jordan's December article "Canada As a Consumer of Chemicals" the editors erroneously inserted a picture caption stating that "40% of the United Nations' bauxite comes from Canada." This should have been "40% of the United Nations' aluminum." Canada, of course, imports all of her bauxite.—EDITORS.

Canadian Review

(Continued from Page 100)

Cordite Manufacture Curtailed

As a criterion of the success with which the chemical industry has met the needs of warfare, the Department of Munitions and Supply reports that the Nobel cordite plant of Defence Industries Ltd. will release 1,400 of its present 2,200 employees this month and will close down completely by midyear. The Nobel plant, rated as the second largest explosive unit in the Empire, came into production in the summer of 1940 and employed 4,500 workers at its peak.

The operating company, Defence Industries Ltd., a wartime subsidiary of C. I. L., manages 14 chemical and small arms factories for the Government, which employed some 32,000 men and women a year ago, and about a third less at present. Other production curtailment orders have been received by three other D. I. L. small arms projects in the Montreal area which will affect 3,000 workers in the next four months.

It is probable that additional Crown plant staff reductions will crystallize later in the year in that chemical and small arms ammunition stockpiles are now substantial and production is geared merely to meet war wastage levels.

New Viscose Rayon Capacity

Courtaulds Ltd., the only viscose rayon producer in the Dominion, is extending its soda settling tank and cake storage facilities to permit the manufacture of 6 million pounds of high tenacity tire yarn this year.

This poundage will accommodate one-third of Canadian requirements, and, for the present, 12 million additional pounds will be imported from the U. S. A.

Dow May Build in Sarnia

Dow Chemicals of Canada, Ltd., is investigating the possibility of establishing a plant in the Sarnia, Ont., area which would utilize surplus material produced by the plant of the Polymer Corp., Ltd., in the manufacture of synthetic rubber, according to George Hemmerick, general manager and treasurer of the Dow Canadian Company. Whether the study is expected to lead to any immediate results was not revealed, but Mr. Hemmerick said that the company had considered the possibility of operations in Canada several times in the past five or six years.

Dow is now operating a styrene unit for the Polymer Corp. at the latter's Sarnia plant.

NEWS OF THE MONTH

Professional Status of Chemists Upheld

NLRB distinguishes professional chemists from non-professionals by granting separate voting groups in union election

THE PROFESSIONAL status of chemists was reaffirmed in an important decision rendered on December 11, 1943, by the National Labor Relations Board in the matter of Monsanto Chemical Company, Merrimac Division, Everett, Massachusetts, and the Chemical Workers Union No. 22606, AFL. NLRB substantiated an earlier (January 13, 1942) holding of the Shell Development Case vs. F.A.E.C.T., stating its opinion that the professional laboratory employees were entitled to voice their desires in the matter of representation in a voting group separate from that of the non-professional employees. This decision further clarified the situation in Production Control Laboratories which involve both professional and non-professional employees.

Upon filing the petition by the Union alleging that a question of commerce had arisen concerning the representation of employees has arisen, the National Labor Relations Board provided for an appropriate hearing before Thomas H. Ramsey, Trial Examiner. The hearing was held at Boston, Massachusetts, on November 12, 1943.

The question revolved about the Company's refusing to recognize the Union as the bargaining representative of certain of its employees unless and until the Union received certification by the Board. The Union sought to represent a unit comprised of all employees of the company engaged in its control laboratory, including professional employees and all hourly paid employees attached, but excluding supervisory employees, while the company contended that the hourly paid employees should be excluded from the unit, and that the professional laboratory workers should be given an opportunity to express their desires with respect to whether or not they should be included within a unit of laboratory employees.

Previously the Union had been certified as the bargaining representative of all hourly paid production and maintenance employees of the Company, excluding chemists and laboratory employees not paid at an hourly rate. However, in the case of two hourly paid employees, a janitor and a bottle-washer, this decision ruled that they were a part of the industrial unit rather than the technical unit as apparent from their job classification.

Approximately 5 persons in the control laboratories at Everett have received degrees in chemistry or related sciences. The company contended that these employees should not be included in the same unit as the non-professional laboratory employees on the ground that a dissimilarity existed between them with respect to interests, type of work, qualifications, methods of payment, amount of supervision, and future prospects with the Company. It was pointed out that while these employees may perform work similar to that performed by the non-professional employees, they are frequently called upon to do special analytical work of a complicated nature, and to handle new and non-routine analyses on their own initiative.

In contrast to the professional employees, the non-professional employees are required to perform only routine analyses. The professional employees are paid on a monthly basis and receive a minimum of supervision, and on occasion they also supervise the work of the non-professional laboratory workers. The non-professional employees are paid on a weekly basis, and require supervision and instruction from the outset. On the basis of these distinctions, the NLRB made its major ruling that the professional employees were entitled to a voting group separate from that of non-professional employees, and directed that separate elections be held among the professional laboratory employees of the Company and the non-professional employees to determine whether or not they desired to be represented by the Union. If the employees in both groups selected the Union as their bargaining representative, they would constitute a single unit, but if only one group selected the Union as its bargaining representative, it would constitute the appropriate unit.

Accordingly, elections were held January 8 and the results found that the professional laboratory workers voted unanimously not to be represented by the Union, while non-professionals voted by 6 to 5 for Union representation. The non-professionals will constitute the appropriate bargaining unit, therefore, according to the NLRB ruling, and the professionals are excluded.

Consultant Clearing House Active

The clearing house for consultants organized two years ago as a free service for both consultants and industry, is filling an important wartime need, judging from the number of requests for consulting service it has handled to date. Over 600 inquiries for specialists on various problems relating to chemistry and chemical engineering have passed through the agency's office at 50 East 41st Street in New York City, according to A. B. Bowers, assistant executive secretary of the sponsoring organization. Coming from all parts of the globe, these requests have carried the signatures of manufacturing companies, civilian and military government bureaus, individuals, attorneys, insurance companies, advertising agencies and institutions.

Despite its war emergency beginning, the clearing house has proved its value so well that it is slated for a permanent place in peacetime, Miss Bowers said. Then, as now, it will assist in locating consultants or laboratories to handle analytical work, testing, research, literature searches, economic surveys, court testimony and litigation, and manufacturing problems such as shipment inspection, equipment and plant design, labelling, product formulation and process development.

To assist those interested in using consulting services, the Association has prepared a "Classified Directory" which is available without charge to interested parties.

Government Stops Scrap Rubber Buying

Jesse H. Jones, Secretary of Commerce, announced on December 22 that, with the approval of the Office of the Rubber Director and the Office of Price Administration, the Rubber Reserve Company would discontinue the purchase of scrap rubber after December 31. Thereafter the scrap rubber business will be returned to private industry.

Since its entry into the scrap rubber business in June, 1942, the Rubber Reserve Company has bought more than a million short tons and about 740,000 short tons have been sold to members of the reclaiming industry and other consumers.

Scientists Urged to Political Action

Gaston DuBois, Perkin Award winner, advocates members of science and industry participate in political and civic affairs

ACTIVE participation in the affairs of the nation, state, and community by men and organizations of science was urged by Gaston DuBois, senior vice-president of Monsanto Chemical Company, St. Louis, in an address before 500 leading chemists and other scientists meeting at the Hotel Commodore on January 7 to pay tribute to him as he received the Perkin medal from the American Section of the Society of Chemical Industry in recognition of his outstanding accomplishments in the field of applied chemistry.

Pointing out that it is useless and unbecoming to criticize the activities of city, state and federal governments unless constructive ideas and a sound program can be suggested, DuBois recommended the establishment of a competent committee of representatives of the scientific and manufacturing activities to enable these representatives to make constructive suggestions on policy and scope as well as on budgets. He maintained that in a democracy it is of first importance that groups of citizens cooperate with government agencies in creating a sound national program which would better serve the needs of the nation.

As science becomes more and more important to civilization and the chemist steps out of his laboratory to engage in new activities related to the widening scope of his industry, he must accept the responsibility that is consistent with his new status, DuBois stated.

"We, as chemists, should assume those civic responsibilities for which we are best suited," DuBois stated. "We chemists should take a very definite interest in the use and control of science, and this will lead to an interest in law and government—which does not mean an interest in 'lobbying,' but active attention to the planning for daily living."

Questions about the manufacturing activities of the federal government were raised by the Perkin medalist: Should our government in peace time manufacture nitrates, ammonia, styrene, butadiene, carbide, synthetic rubber, phosphorous, fertilizers? Can our government successfully compete with industry? "I do not know the answer," DuBois said, "but I do know that the fact should be obtained without prejudice or partisanship."

DuBois said the changes in the patent system proposed in the report of the National Patent Planning Commission are as important to the chemist as to the business man or the lawyer.

DuBois became the thirty-eighth member of the group of distinguished chemists to receive the Perkin medal. Born in Switzerland in 1880, he came to America in 1904 at the invitation of John Francis Queeny, founder of Monsanto, and accepted a position with the company. He has remained with Monsanto since that time, and has contributed to practically every technical development of the company and its subsidiaries. He is now devoting his full time to the company's technical program in all its phases, developing new projects and processes for peacetime and improving operations for the period immediately following the cessation of hostilities.

DuBois' first job on coming to America was to set up the manufacture of vanillin by a process brought over from Germany. When World War I cut off the import of intermediates, including phenol, chlorbenzene, nitrochlorbenzene, phenetol, phenetidine, chlorine, and caustic soda, DuBois stepped into the breach by rapidly developing processes, design and plant construction, thereby avoiding a shut-down of the company's pharmaceuticals and condiments. When phenol was developed, salicylic came along, followed by aspirin in 1917.

When Monsanto extended its phosphorus operations DuBois brought about a fundamental change in the manufacturing process whereby phosphorus would be condensed as such and recovered separately from the carbon monoxide gas. Phosphorus could then be produced in much greater quantities, and the carbon monoxide gas has proved to be a valuable fuel.

DuBois has been active in the development of the Monsanto process for making styrene, now used principally in the manufacture of synthetic rubber but originally developed by the company as a base for plastics. Also in connection with plastics, DuBois has taken considerable initiative in the development of resinous adhesives for plywood. Other notable accomplishments are his work in the electrochemical separation of bismuth, and the development of the vanadium pentoxide catalyst in this country.

Mexican Bill May Bar Foreign Professionals

A current proposal which has passed the Mexican Chamber of Deputies and is awaiting Senate action would alter the Mexican constitution so as to deny the privilege of professional practice to all but Mexican citizens. The measure states:

"No foreigner can exercise, in the Federal District and Territories, the technical and scientific professions. Naturalized Mexicans who have made all their studies in accredited institutions of higher learning, will enjoy the same conditions of professional practice as Mexicans by birth. Only in exceptional cases can the General Administration of Professions concede temporary permission to practice to foreign professional men and women residing in the Federal District and Territories who prove themselves the victims of political persecution in their own countries.

"Degrees issued abroad to Mexicans by birth will be recognized by the Ministry of Education, providing that the courses leading to the professional title are equal or similar to those in dependent institutions of the (Mexican) state. In cases where it is impossible to determine the equality or similarity of studies in the foregoing manner, a method of evaluating the studies will be set up; the candidates in each case to be subjected to tests or examinations of their training."

Professional classes which would be affected by the amendment include pharmaceutical chemists, chemical engineers, engineering specialists, biologists, bacteriologists, pharmacists, and others.

Stauffer To Head American Anode, Inc.

Identified with the B. F. Goodrich Company for the past 50 years, B. F. Stauffer has been elected president and general manager of American Anode, Inc., as of January 1 at the annual meeting of the Akron company. Stauffer has served B. F. Goodrich in various production and sales capacities and was assistant general manager of the industrial products sales division when elected.

Tung Oil Substitutes Sought

A research program to develop adequate substitutes for tung oil, a vital element in manufacture of coatings and finishes for various war materials, has been set up by the National Defense Council, in cooperation with the Research and

Development Branch, Office of the Quartermaster General, Temple University, Philadelphia and industry, the War Department has announced.

Dr. William T. Pearch of the National Research Council is directing the study from Temple.

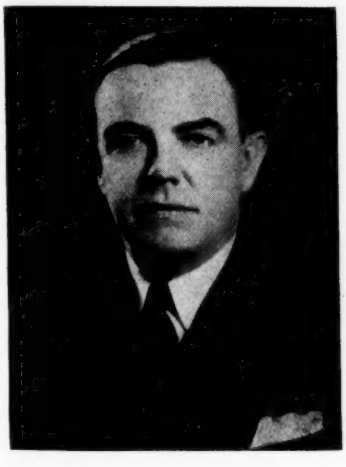
Pursuing the policy of utilizing existing facilities instead of constructing new ones, Quartermaster Corps technicians working with the research groups said the actual development work will be done in industrial laboratories already set up to conduct such experimental work.

Although only recently formally organized, the research already conducted has led to valuable information concerning properties of certain so-called synthetic oils, produced entirely through chemical processes, and some of the synthetic resins, such as alkyds, which will permit them to be substituted in some of the uses to which tung oil is ordinarily put.

Need for such a research program has been apparent for some time, the Department said, since our normal supply of tung oil has always come from China, and is now virtually nonexistent.

Tung trees have been started in this country from seeds, and some are growing now, but the time required for a seedling even to begin producing the needed oil is from five to six years, and production now is but a small fraction of wartime needs.

Koppers Elects Vice-President



The president of the Koppers Company, of Pittsburgh, Pa., has announced the election of George M. Carvlin as vice-president of the Engineering and Construction Department. G. M. Carvlin has been serving as assistant to the vice-president and general manager.

Tin Reaches War Plants

Nearly 200 million used tin tubes, most of which formerly contained toothpaste and shaving cream, have been turned in by consumers during the past 16 months for use in making war material, according to the National Wholesale Druggists' Association, which has been cooperating with the Tin Salvage Institute, Newark, N. J., in this war conservation effort.

Tubes received since the campaign started in July 1942, represent a gross weight of 7,300,475 pounds, from which so far 1,154,958 pounds of tin, 1,497,119 pounds of lead, and 38,211 pounds of other metals have been reclaimed to date. All the metal thus reclaimed is owned by the government and is allocated to war production plants to be used in making bombers, tanks and other weapons.

A considerable supply of used collapsible tubes is still on hand, waiting to be sorted and processed, the Tin Salvage Institute has notified N.W.D.A. officials.

OWI Explains "Cutbacks"

The Office of War Information on January 7 issued the following statement on curtailments of war production, basing it on data from the Navy, the Army, the War Production Board, and the U. S. Maritime Commission.

None of the curtailments, or "cutbacks," to date has been based upon plans for resuming manufacture of civilian goods. No considerable curtailments for that purpose can be scheduled during 1944 unless the war in Europe should take an early decisive turn in our favor, ending hostilities not later than June or July. Until then, whatever resumption of civilian production WPB permits must be considered purely as temporary, and subject at all times to a return to military production when required.

The present series of adjustments in war production and those projected for coming months are dictated by:

(1) Changing military requirements resulting from combat experience.

(2) Overproduction of some raw materials and military equipment. This has come about largely because at the war's outset our production goals had to be scaled high enough to provide for any contingency—the seeming possibility of the fall of Russia, an invasion of this continent, or almost total destruction from the air of British and Russian industry.

The consensus of officials of the Army, and civilian war agencies is that any return to civilian manufacture during the year, bevond the 2,000,000 electric irons and 50,000 bathtubs recently authorized by the War Production Board, will probably be in goods necessary to maintain the civilian economy. WPB states, "Our severely burdened railway and motor transport systems and our heavy war industries must have first call on replacements and maintenance equipment as they become available." Indications also are that some electric refrigerators and stoves for war housing may be scheduled for 1944, provided the situation in metals continues to ease and further cutbacks in war items provide facilities for manufacture.

OWI pointed out, however, that if the United Nations should be checked during the year, if large-scale landings in Europe are repulsed, the current trend would be reversed abruptly. Production of war materials, now curtailed or even terminated, would have to be resumed and radically increased. In most cases of cutbacks, standby facilities are retained against this possibility.

Organic Research Head Named

Dr. R. Max Goepp, Jr., has been appointed Director of Organic Research of the Atlas Powder Company, Wilmington, Delaware. His previous work, mainly in the field of carbohydrate chemistry, having been past-chairman of the Sugar Division of the American Chemical Society.

CED States Program

The outstanding task of the Committee for Economic Development for 1944, according to a recent announcement, will be to make available to American business employers the latest practical knowledge needed to help them effect an expansion of postwar production and employment to high peacetime levels. The material will be passed along through local CED committees to individual business firms.

CED's new program is based on the six major functions or aspects of postwar planning to be undertaken by an industrial or manufacturing firm:

I. Organization of the firm's overall planning program, including the defining and placing of responsibility in such a way that it will not interfere with war work.

II. Analysis of products, their redesign, or the addition of new products.

III. Analysis of markets, and the planning of sales and advertising programs.

IV. Planning for production facilities

required to produce expanded postwar volume.

V. Estimate of number of employees needed for expanded postwar volume and the necessary employee training program.

VI. Analysis of financial requirements for reconversion and expansion for postwar business.

Aluminum Output Soars

The aluminum industry last year attained an annual production rate of 2,100,000,000 pounds of metal, seven times the nation's peacetime production, according to Roy A. Hunt, president of the Aluminum Company of America. He said that it is one and one-half times the production of the entire world before this war and that it is far in excess of what the combined Axis countries can produce.

"What this vast aluminum expansion will mean in terms of jobs will become clearer as the metal is released for civilian consumption," Mr. Hunt declared. "This is especially true as industry begins to use it for new applications growing out of wartime experiences or encouraged by the present favorable price position of aluminum. Alcoa's price for aluminum ingot at the time priorities were imposed was 20 cents a pound; several price reductions since that time have brought it to a record low of 15 cents at a time when the prices of many competing materials were rising.

"How well employment levels in the aluminum industry may be maintained depends upon a number of things, among them: Whether or not restrictions are more completely removed on aluminum for civilian uses; whether there is to be an accumulation of large metal surpluses, which could conceivably come back to demoralize the industry at a later date; and the degree of success aluminum achieves in finding new and increased post-war uses.

"Before the war the nation was dependent upon only high-grade domestic and imported bauxite for alumina. Today, using a process developed by Alcoa after twenty-five years of research. the industry is making alumina from low-grade bauxite and even the red mud residue from the familiar Bayer process."

OPA Appoints Sims

In keeping with the Office of Price Administration policy of staffing its operating branches with experienced business men, Price Administrator Chester Bowles has announced the appointment of *William L. Sims II*, of Orlando, Fla., as price executive of OPA's Chemicals and Drugs Branch, effective January 1. The new price executive succeeds Joseph D. Coppock, who has accepted an appointment with the Office of Strategic Services.

CALENDAR OF EVENTS

AKRON RUBBER GROUP, Winter Meeting (Newspapers and the War), Portage Hotel, Akron, O., Feb. 4.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, Winter Technical Meeting, Engineering Societies Building, New York, N. Y., Jan. 24-28.

AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS, INC., Annual Convention, Waldorf-Astoria Hotel, New York., Feb. 21-24.

AMERICAN MANAGEMENT ASSOCIATION, Personnel Conference, Palmer House, Chicago, Ill., Feb. 9-11.

AMERICAN MANAGEMENT ASSOC., Finance Conference, Hotel New Yorker, New York, N. Y., March 1-2.

AMERICAN PAPER AND PULP ASSN., Annual Convention, The Waldorf-Astoria Hotel, New York, N. Y., Feb. 14-17.

AMERICAN SOCIETY FOR TESTING MATERIALS, Spring Meeting and Committee Week, The Netherland Plaza, Cincinnati, O., Feb. 28-Mar. 3.

COMPRESSED GAS MANUFACTURERS ASSOC., INC., 31st Annual Meeting, Waldorf-Astoria Hotel, New York, N. Y., Jan. 24-25.

DRUG, CHEMICAL & ALLIED TRADES SECTION—NEW YORK BOARD OF TRADE, INC., 19th Annual Drug Dinner, Waldorf-Astoria Hotel, New York, N. Y., Mar. 9.

PUBLIC UTILITIES SALES EXECUTIVES' CONFERENCE, Netherland Plaza Hotel, Cincinnati, O., Jan. 25-26.

TECHNICAL ASSOC. OF THE PULP & PAPER INDUSTRY, Annual Meeting, Commodore Hotel, New York, N. Y., Feb. 14-17.

SOCIETY OF PLASTIC INDUSTRY, Annual Meeting of the Canadian Sec., Payne York Hotel, Toronto, Canada, Jan. 25.

INTERNATIONAL ACETYLENE ASSOC., James Turner Morehead Medal Dinner, The Union League Club, New York, N. Y., Jan. 24.

SOCIETY OF PLASTIC INDUSTRY, Second Annual Conference of the Pacific Coast Sec., Ambassador Hotel, Los Angeles, Calif, Feb. 21-22.

Thompson Appointed Manager

The construction firm of Barrett & Hilp has announced the appointment of W. A. Thompson, Jr., as manager of its Petroleum and Chemical Division. Thompson has been prominently identified with eastern installations of refinery facilities.

Civilian Plastics Curtailed

Production of a number of plastic items such as combs, buttons, cosmetic containers, zippers, lipstick containers and some small kitchenware items, will be curtailed during the coming few month because of restrictions in the use of plastics ordered by the War Production Board. Recent developments in the chemicals industry WPB said, have made it necessary to cut down on some plastic materials used in certain civilian industries of lower essentiality.

Of the products mentioned those made entirely of polystyrene and phenolics will be out entirely, officials said, inasmuch as there are no substitute materials available from which the plastics can be made. Officials estimated that at least a half dozen substitutes can be found for the cellulose plastics used in manufacturing the affected items and that the lag in production and in shipments will depend upon how rapidly manufacturers can adapt their process to the new situation.

In discussing polystyrene and phenolics, WPB officials said, both of these plastics are directly dependent upon benzene as a basic raw material. War demands for benzene, chiefly for aviation gasoline and rubber, are far in excess of capacity production. Stock-pile depletion requires immediate conservation measures and many marginal civilian uses for both polystyrene and phenolics may be curtailed partially or completely. For the next six months applications for marginal uses will be scrutinized carefully from three standpoints: (1) Efficient usage of the material; (2) essentiality of the product for civilian economy, and (3) availability of alternate materials.

The depletion of phthalate plasticized stock piles has necessitated conservation measures that will have a direct bearing on the availability of cellulose acetate and acetate butyrate. Instructions have gone out to material manufacturers that alternate; less critical plasticizers must be used for materials for marginal civilian uses, and that formulations may not contain more than 10 per cent phthalate plasticizer. Some delay in shipments for marginal uses will probably result, until workable non-critical plasticizers can be adopted.

Tannery Cartel Charged

The Government filed a civil suit in the United States District Court on December 20 charging three foreign and three American corporations with maintaining an international cartel in quebracho, a tanning material derived from a tree found almost exclusively in Paraguay and Argentina. The suit charges violation of the Sherman Anti-Trust Act, and seeks severance of financial relations of the foreign and domestic companies, cancellation of certain agreements and the abolition of practices alleged to have forced American tanners to pay fixed and arbitrary prices for the quebracho extract.

The defendants in this country are the

Tannin Corporation of New York City; Tannin Products Corporation, a Delaware corporation with offices in New York City, and the International Products Corporation, a Delaware corporation with offices in New York City. The others are the Forestal Land, Timber and Railways, Ltd., an English corporation with principal offices in London; St. Helen's Holdings, Ltd., a Canadian corporation with offices in Montreal, and La Forestal S. A., an Argentine corporation with offices at Buenos Aires. According to Assistant Attorney General Wendell Berge, under whose direction the suit was filed, in the last two years more than 200,000 tons of quebracho, with an approximate value of $20,000,000, have been imported here from Argentina.

Carman Chosen Manager

With the appointment of F. H. Carman as general manager, the Plastics Materials Manufacturers Association announced the expansion of technical activities of the group for the year at the annual meeting on January 15. Mr. Carman previously was associated with WPB handling the allocation of neoprene and acting as technical consultant for the Chemicals and Allied Products Branch.

New Plastic Association Formed

Representatives of ten large manufacturers of synthetic resin adhesives met in New York January 13, 1944, and formed the Resin Adhesive Manufacturers' Association aimed primarily at "offering cooperation in utilizing synthetic adhesives for war products and unified industry action on industry-wide problems in dealing with the armed services and other government agencies."

The need for the new organization was recognized through the activities of the Plastics Materials Manufacturers' Association wherein the assistance to industry and the armed forces on those products indicated a similar service could be rendered in connection with the utilization of these adhesives. The new association includes those concerns whose adhesives are based on phenol, urea, resorcin, melamine, vinyls and alkyd resins.

The group will include a large share of the companies now producing synthetic resin adhesives for further sale or manufacture. The officers of the new association are: President, Mr. W. F. Leicester, Vice President Casein Company of America; Vice President, Mr. C. F. Hosford, Jr., President Pennsylvania Coal Products Co.; Secretary-Treasurer, Mr. J. E. Waller.

The Board of Directors consists of the President and Vice President together with Mr. James L. Rodgers Jr. of the Plaskon Division of Libbey Owens Ford Glass Co. Two additional directors are to be elected in a subsequent meeting.

Representatives of the following companies attended the organization meeting: Plaskon Division, Libbey-Owens-Ford Glass Co., American Cyanamid Co., Casein Company of America, I. F. Lauchs, Inc., Durez Plastics & Chemicals, Inc., Catalin Corporation, Monsanto Chemical Company, Reichhold Chemicals, Inc., Pennsylvania Coal Products Company, Marblette Corporation.

Steel Output Sets New High

The steel industry exceeded in 1943 all previous production records for the fourth consecutive time, according to Walter S.

Tower, president of the American Iron and Steel Institute.

About 89,100,000 tons of steel ingots and casting were produced in the year, about 70 per cent more than the estimated production in Axis Europe and Japan, he said. American output was nearly 3,500,000 tons above the 1942 figure and 80 per cent greater than output in the best year of the first World War.

"October proved to be the high month for steel production in 1943 and may even turn out to be the peak month of the entire war period," Mr. Tower said. "From the total of 7,786,000 tons of steel produced in October, both the demand for and the production of steel declined gradually to the year's end.

"Looking ahead, there are definite indications that military demands for steel in 1944 will be less than they were in 1943. Cut-backs, notably steel for lend-lease, have been reflected in cancellation of some steel orders, and a few steel furnaces have actually gone out of production for lack of business.

"Meanwhile, steel capacity in this country increased substantially during 1943 as the Government-sponsored expansion program was nearing completion. As of the end of the year, steel-making capacity is close to 94,000,000 tons annually and by the spring of 1944 will approach 96,000,000 tons.

"The rise in steel-making capacity and the apparent passing of the peak of war demand mean that authorities must now tackle the problem of how soon and how much to relax or rescind certain Government restrictions and regulations affecting the civilian use of steel."

COMPANIES

Expands into Plastics Field

In a further expansion of the Libbey-Owens-Ford Glass Company into the field of plastic resins, the corporation has acquired the Paramet Chemical Corporation, manufacturer of alkyl and phenolic resins and ester gums.

The purchase of the chemical concern was effected through a new wholly owned subsidiary of Libbey-Owens-Ford which has been named the Paramet Corporation.

Early last year the glass company purchased the minority outstanding stock of the Plaskon Company Inc., in which it had been a majority stockholder for some years, and set up Plaskon as a division of Libbey-Owens-Ford. Plaskon is a manufacturer of synthetic resin molding compounds and adhesives.

Paramet is to retain its autonomy under the new ownership as far as possible, operating as an adjunct of the Plaskon division, Paramet manufacturers alkyd resins, phenolic resins, modified phenolic resins and ester gums. To this line of products will be added the urea formaldehyde resins made by Plaskon. Hitherto, Plaskon has sold resins to the paint and varnish trade, but the combined list of products of Paramet and Plaskon will make possible an appreciable expansion of L-O-F volume in that industry.

Officers of the new Paramet Corporation are James L. Rogers, Jr., president; Bernard W. Slater, vice-president and general manager; C. Homer Flynn, vice-president and sales manager; W. R. Feldtman, treasurer, and C. O. Marshall, secretary. Messrs. Slater and Flynn have been long associated with Paramet, and the other officers are connected with the Plaskon division.

Lacey Appointed by Calco

Dr. Harold T. Lacey has been appointed division chemist in charge of lakes and intermediates for the dry color and printing trades. Dr. Lacey studied in Vienna, Munich, and Graz, and became a Fellow of the Mellon Institute in 1929. He joined the Calco Chemical Company in 1932, and has been active in research on synthetic organic pigments and oil colors since then.

General Foods Appoints

Thomas M. Rector, General Foods Corporation vice-president in charge of research and development, recently announced the following promotions and organization changes affecting the company's Central Laboratories.

Dr. Aksel G. Olsen has succeeded Mr. Rector as manager of Central Laboratories. Dr. Roland E. Kremers has been appointed director of basic research, with supervision over the organic chemistry and physical research sections, and the newly created biochemistry section. Dr. Harry M. Barnes became director of the organic chemistry section. Harvey K. Murer was appointed director of the biochemistry section.

Charles W. Kaufman now heads the processing technology section. Dr. Willard L. Roberts was appointed director of the cereal technology section. Hamilton W. Putnam has charge of the cereal chemistry division, and Dr. Martha Johnson was appointed head of the division of analytical chemistry.

Included in these personnel changes are the appointments of Dr. Thomas R. Wood as a member of the staff of the organic chemistry section and of Emanuel Dichter to General Foods research.

Battelle Additions

Elmer F. Stephan, formerly assistant professor of chemistry at St. Bonaventure College, has been appointed to the research staff of Battelle Memorial Institute, Columbus, O., where he will be engaged in studies of industrial problems in the field of electrochemistry. Also appointed to Battelle's staff were O. M. Urbain and Warren R. Farrington, who have both been assigned to its division of analytical chemistry.

Paco Personnel Changes

John Karrh recently joined the staff of the Development and New Chemicals Division, Publicker Commercial Alcohol Co. He has been appointed plant manager of the new butadiene plant, construction of which is rapidly nearing completion at Eddington, Penna. Virgil D. Drummond has been appointed chief chemical engineer of the same division. Other recent additions to the staff include—Dr. Alfred Clark, Dr. Philip J. Elving, Richard S. Wilder, formerly with National Aniline, and Dr. George D. Martin.

Among the younger recent additions to the Development Division are: O. P. Balestracci (Worcester Polytechnic), J. Cording Jr. (Drexel), Dr. E. L. Holljes (Penn.), Shen Pai Hua (M.I.T), Dr. Martin S. Kulpinski (Fordham), Carl A. Scheuneman (Drexel), William Spivack (Penn. & P.C.P.), Philip E. Tobias (Cooper Union and Brooklyn Polytechnic), Edwin V. Winslow (Drexel), Daniel B. Witwer (Akron Univ.) The Bacteriological and Research Department has recently added to its staff Rose R. Ichelson (Philadelphia College of Pharmacy), Dr. Morton M. Rayman (Iowa State), Frank L. Saltarelli (University of Washington).

Ansco Takes Old Name

George W. Burpee, president of the General Aniline and Film Corp., announced recently that the name of the photographic materials division of the company, which has its headquarters at Binghamton, N. Y., has been changed from Agfa Ansco to Ansco.

Ansco was the original name given to the company, whose activities began 100

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U.S.I. CHEMICAL NEWS

January ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1944

"Arylides" Improve Tinctorial Strength of Yellow Dyes

U. S. I. Line of Acetoacetarylides Replacing Scarce Chrome Yellows

The acetoacetarylides have recently taken on added importance as intermediates for yellow pigment dyestuffs due to the present restrictions on chrome yellows. As a result it is anticipated that the use of these "arylides" will grow substantially as their advantages becomes more widely known. Among the advantages of the yellows made from these intermediates are much greater tinctorial strength and higher alkali resistance.

The acetoacetarylides are used in the manufacture of Hansa yellows and the newer benzidine yellows. Hansa yellows are coupling products of acetoacetarylides with diazotized aniline derivatives. Benzidine yellows were first described in German Patent No. 251,479 issued in 1911, and are made by combining tetrazo benzidine with acetoacetarylides. Hansa yellows are particularly resistant to the action of alkalies and of sunlight. Benzidine yellows are non-bleeding in water, dilute acids and alkalies. In addition, they are fairly resistant to melted parrafin, alcohol, and other common organic solvents except chloroform.

By varying the intermediates used, a large number of yellow dyestuffs can be produced having different characteristics, such as shade, and fastness to various agents; thus the class as a whole has many wide fields of application. A great many factors during production influence the quality and uniformity of these end-products, of which one of the most important is purity of the intermediates. The exacting production methods of U. S. I. reduce impurities to an unobjectionable minimum.

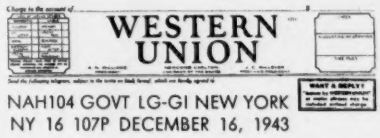
On a commercial scale, U. S. I. produces:

acetoacetanilide
acetoacet-ortho-chloroanilide
acetoacet-para-chloroanilide
acetoacet-ortho-toluidide
acetoacet-ortho-anisidide

In addition, U. S. I. has developed the following new compounds:

acetoacet-para-anisidide
acetoacet-para-phenetidide
acetoacetyl-alpha-napthylamine
NN' -diacetoacetbenzidide
acetoacet-cresidide
acetoacet-dianisidide
diacetoacetyl-meta-toluylenediamine
ortho-phenylacetoacetanilide
acetoacet-para-nitroanilide

Sample quantities of these are available for laboratory experimentation.



NAH104 GOVT LG-GI NEW YORK
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TO THE MEN AND WOMEN OF THE U. S. INDUSTRIAL CHEMICALS, INC. 60 EAST 42 STREET NEW YORK REPORTS FROM WAR FRONTS TESTIFY TO THE IMPORTANCE OF ATABRINE WHICH HAS PROVEN AN EXCELLENT SUBSTITUTE FOR QUININE THIS PRODUCT HAS FILLED A NEED OF THE MEDICAL CORPS AND IS RESPONSIBLE NOT ONLY FOR THE MAINTENANCE OF HEALTH OF OUR TROOPS BUT FOR SAVING OF LIVES YOUR VIGOROUS EFFORTS TO INCREASE THE PRODUCTION OF THE ESSENTIAL INGREDIENT ETHYLACETOACETATE IS DESERVING OF SPECIAL COMMENDATION YOU MAY BE PROUD OF YOUR CONTRIBUTION TO THE WAR EFFORT.

KIRK MAJOR GENERAL
SURGEON GENERAL OF THE ARMY
WASHINGTON, D.C.

New Uses Seen for Ethyl Sodium Oxalacetate

Research chemists have long been aware of the broad potentialities of the ethyl ester of oxalacetic acid. Many interesting reactions have been suggested and studied. Usually, however, efforts to put these reactions to commercial use have been balked by the instability of the ethyl ester.

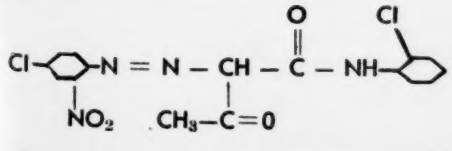
With the introduction of U S. I.'s sodium derivative — ethyl sodium oxalacete — this stumbling block was moved aside. In a comparatively brief period, this unusual new intermediate has found acceptance on a tonnage scale in the synthesis of both dyestuffs and pharmaceuticals, particularly the tartrazine and pyrazole groups. Its structure, moreover, suggests a variety of other possible reactions which will find increasing use in the preparation of many new products.

Fight Infantile Paralysis
JOIN THE MARCH OF DIMES
January 14 to 31

Ethyl sodium oxalacetate is prepared by reacting ethyl acetate and diethyl oxalate with metallic sodium. It is a fine granular powder, light yellow in color, and, as manufactured by U. S. I., has a purity of not less than 92%. Its stability is shown by the fact that a sample previously dried at 100° for one hour loses not more than 3% of its weight in an additional 24 hours at 100°. Ethyl sodium oxalacetate may be used in most reactions in place of oxalacetic

(*Continued on next page*)

Illustration: Hansa yellow 3G.



A typical "arylide" end product, Hansa yellow 3G. Diazotized p-chloro-o-nitro aniline coupled with acetoacet-ortho-chloroanilide.

New Alkyd Resin Meets Revisions in U.S.M.C. "Specs"

S & W Division Also Announces Resin Replacement Available for Civilian Applications

In its all-out effort to give America's vast maritime fleet the staunchest possible protection against rust, the U. S. Maritime Commission is constantly aiming to upgrade its specifications for paint. Recently announced was the specification for a new alkyd resin to provide even greater durability, flexibility and adhesion in primers.

To meet this specification (52-MC-21) calling for a long, pure-linseed-oil modified

Photo courtesy U. S. Maritime Commission

Off the ways, and on its way to join America's Victory Fleet! Many of these U.S.M.C. ships are protected against constant exposure to the elements by coatings formulated with S&W Resins.

alkyd resin, U. S. I.'s Stroock & Wittenberg Division announces a new, specially-developed resin, Aroplaz 1244, possessing the following physical constants:

Viscosity (G-H) at 70% solids	Y minus – Z1
" (G-H) (when thinned further to 50% solids in Mineral Spirits)	C – G
Color (G-H 1933)	7 – 12
Acid Value of Plastic	Below 10
Wt./Gal. @ 25° C. at 70% solids	7.92 – 8.08 lbs.

Aroplaz 1244 fully meets the new U. S. M. C. resin specification. It has been thoroughly tested in the formulation of paints based on these two new U.S.M.C. primer specifications:

52-MC-23 Primer red lead, quick-drying (synthetic). This specification supercedes MC-52-A-1 (Class XXII)
52-MC-29 Primer, zinc chromate.

New Resin for Civilian Work

Another development, interesting not only from the viewpoint of performance, but particularly because of its availability, is Stroock & Wittenberg's Aroplaz 1306 Solution (75%

(*Continued on next page*)

January ★ **U.S.I. CHEMICAL NEWS** ★ 1944

New Alkyd Resins

(Continued from preceding page)

solids in mineral spirits). The physical constants of this new resin are:

Viscosity (G-H) at 75% solids	Y – Z1
Color (G-H 1933)	7 – 9
Acid Value of Plastic	10 – 20
Wt./Gal. @ 25° C. at 75% solids	7.9 lbs.

The solution is so adjusted that when reduced to 50% solids, the viscosity is suitable for use as a normal enamel vehicle.

Excellent white enamels can be produced with this material, approaching the whiteness obtained with the usual alkyd types now no longer available for civilian work because of Government restrictions.

Aroplaz 1306 has good color retention when compared to maleic resin varnishes, and is far superior to Ester Gum and phenolic resin varnishes. This important resin is now available without allocation.

Additional data regarding both of these resins, as well as samples, are available.

Inhibits Crystallization in Anodic Metal Polishing

A recently granted patent on the composition of an electrolyte bath for the anodic polishing of stainless iron and stainless steel covers the use of an alcohol to inhibit crystallization upon chilling. The electrolyte mixture described consists of a water-soluble aliphatic carboxylic acid, a member of the group consisting of mono-, di- and tri-hydric aliphatic alcohols and mixtures thereof having up to 5 carbon atoms, and a soluble compound having a sulphate radical which provides a sulphate ion in the bath. The alcohol is used in an amount less than approximately 10 percent by volume, water in an amount less than approximately 50 percent by weight of the bath.

Patents Synthesis of New Organometallic Compounds

A solution of an organometallic compound is prepared, according to a recent British patent, by treating an anhydrous tetrahalide of titanium, zirconium, or silicon with an anhydrous amine, in an anhydrous solvent. The compound formed is of the general formula $(AmX)_4M(Am)_4$ in which Am is an organic amine, X is a halogen and M is titanium, zirconium or silicon. The amines can be either alkyl or aryl. Suitable solvents include anhydrous ethanol and butanol.

"Hammered" Appearance Simulated on Metals

A method of applying coatings which dry to a hard finish and give the appearance of metallic craters produced by hammering, has been patented. The method involves application of a mixture containing a film-forming agent, a solvent, a granular pigment, and a flake metallic powder.

The film is allowed partially to set and is then spattered with a highly volatile solvent such as ethyl alcohol. The solvent is applied in the form of coarse droplets under a fluid pressure of about 2 pounds and an air pressure of less than 15 pounds. The drops of solvent dissolve the film-forming agent, producing the effect of small craters.

Ethyl Sodium Oxalacetate

(Continued from preceding page)

ester, but if desired the latter may readily be regenerated from the sodium derivative by dilute acids.

Typical reactions of oxalacetic ester in which the more stable sodium derivative might be used, include:

1. Ammonia and many of the primary and secondary amines add on to oxalacetic ester. The resulting products may be converted to the amines of oxalocitric acid lactone ester.
2. If aldehydes are present when certain amines are condensed with oxalacetic ester, dioxopyrrolidine carboxylic acids are formed.
3. Urea's condensation with ethyl oxalacetate is of interest because both amino groups react, the product being ethyl uracil-4-carboxylate. The free acid melts at 347° C. and is so stable that up to 185° to 205° C., 20% sulfuric acid has no effect on it.
4. In the presence of pyridine, ethyl oxalacetate and ethyl cyanoacetate form triethyl cyanoaconitate.
5. With hydrochloric acid, oxalacetic ester is converted into derivatives of alpha-pyrone.
6. According to a recent article, oxalacetic acid is reduced by yeast to malic acid.
7. In the presence of piperidine or diethyl amine, 2 molecules of oxalacetic ester condense with one molecule of an acyclic aldehyde.
8. Acetic anhydride and oxalacetic ester form ethyl acetoxyfumarate.
9. Heated to 250-350° C., oxalacetic ester loses carbon monoxide and forms ethyl malonate.

Samples of ethyl sodium oxalacetate are available from U. S. I. upon request.

TECHNICAL DEVELOPMENTS

Further information on these items may be obtained by writing to U.S.I.

Paint recovery, from water used in spray booths, is aided by a new product which prevents formation of scum and makes for a smooth, readily-dispersable sludge. (No. 769)

U S I

Refractive index, as an indication of liquid purity, can now be measured continuously, by means of a new refractometer embracing a dipping liquid prism mounted in a pressure cell through which the liquid flows. Developed for indicating the purity of butadiene, the instrument promises time-saving applications in many other fields. (No. 770)

U S I

A penicillium nutrient medium, said to produce cultural conditions favorable to increased production of penicillin, is announced. (No. 771)

U S I

Measuring density of transparent films, gases, liquids and plastics is said to be simple and extremely accurate with a new photoelectric system. The maker reports successful use of new system in controlling transparency of optical filters, turbidity of liquids, density of flue gases, etc. (No. 772)

U S I

A portable CO_2 analyzer is claimed to so simplify on-the-spot analysis that a complete test of flue gas can be made in 40 seconds. (No. 773)

U S I

Heat-Resistant Gloves, in which a wool lining replaces scarce asbestos, are now being offered in a one-fingered mitt pattern designed to permit ventilation and assure comfort to the wearer. (No. 774)

U S I

Chemical stoneware, featuring new, high heat-shock resistance, is reported to possess 27% higher mechanical strength than usual stoneware, 400% greater thermal conductivity, and to be less porous. The new equipment, available in capacities up to 1000 gallons, can be heated by hot gases, direct steam, or even open flame, says the maker. (No. 775)

U S I

A new synthetic rubber, the sixth major type, has been developed. Promising higher resistance to solvents and other penetrating chemicals than either natural rubber or former synthetics the new rubber opens interesting possibilities in the manufacture of many specialties—from oil hoses to raincoats that can be dry cleaned. The new product is said to be odorless and more resistant than other synthetics to sunlight, ozone, and oxygen. (No. 776)

U S I

Internal inspection of molded plastic, rubber, ceramic and light alloy parts is possible with a new electronic machine which provides for both fluoroscopic and radiographic examination. Operating on standard 110-volt circuits the machine handles objects up to 21"x18"x9" in size. (No. 778)

U S I

Users of transparent prints (ammonia process) are invited to try out a new product said to speed up printing and developing, give sharp images, and pick up delicate detail. The maker offers to furnish free trial samples to 100 users with the understanding that they will report on the results obained. (No. 779)

years ago when Edward A. Anthony established a photographic organization in New York. This company merged with the photographic division of Scoville Mfg. Co. in 1902, the combined enterprise uniting the first syllables of the earlier companies to become the Ansco Company.

Charge ICI, Du Pont Seek World Monopoly

Four corporations and five individuals were made defendants January 6 in an anti-trust suit filed in Federal court by the Department of Justice with the announced purpose of striking a "major blow" against the international cartel system. Those accused were Imperial Chemical Industries, Ltd., of London, Imperial Chemical Industries (New York), Ltd., E. I. du Pont de Nemours & Co., Inc., Remington Arms Company, Inc., and Lammot du Pont, chairman of the du Pont concern; Walter Samuel Carpenter, Jr., president of the same corporation; Charles Krum Davis, president and general manager of Remington; Harry Duncan McGowan (Lord McGowan), chairman, and Henry Mond (Lord Melchett), deputy chairman of ICI.

The action alleged that since some time before 1920 there had been agreements among some of the defendants, and since 1933 all of them had been united on a division of world markets in the chemical industry. The complaint said that "the future expansion of domestic and of world industry is to a great extent dependent upon the unrestricted development" of this industry. It asked the court to enjoin the defendants perpetually from forming or adhering to agreements of the allegedly monopolistic nature described.

It asked further that du Pont and ICI be required to grant a royalty-free license "with respect to any invention which the said defendants have used in carrying out the aforesaid illegal combination," to anyone requesting it.

Wendell Berge, chief of Attorney Gen-

Heads of New Dow Sales Offices Announced

Alfred A. Lawrence and Alexander Leith have been appointed heads of the new Dow Eastern Sales Offices in Boston and Philadelphia, respectively. Mr. Leith has been with the New York Sales Office of The Dow Chemical Company, and Mr. Lawrence, before joining the Dow, had extensive experience in textile finishing. Three other men will represent Dow in each of the two new offices.

eral Francis Biddle's Anti-Trust Division, asserted.

"The arrangements between these groups if allowed to go undetected and free from the enforcement of domestic laws are nothing but private treaties—as far-reaching as any governmental action but free from Congressional sanction. Their production quotas and divisions of markets are private tariffs enforced without legislative consideration.

"However well-meaning these private groups may be, they have assumed sovereign and governmental powers—contrary to the American system of free enterprise. Many of the world cartel groups are now assembling in order to be able to continue their arrangements in the post-war world."

Alcohol Denaturant Accepted

The use of Givaudan's racemic menthol in place of menthol U.S.P. as a denaturant for specially denatured alcohol has been approved by the Treasury Department, following a request for a ruling by Givaudan-Delawanna, Inc. Dr. Eric C. Kunz, Givaudan president, hailed this action as further evidence of the acceptability of racemic menthol as a replacement for laevo-menthol in formulae where the latter was hitherto used, though now unobtainable.

Glass Merger Announced

The Libbey Glass Company of Toledo and the Owens-Illinois Pacific Coast Company became divisions of the Owens-Illinois Glass Co., January 1 under a program of reorganization. The firms, heretofore operated as wholly-owned subsidiaries, were dissolved and their businesses are now conducted as divisions of the parent company.

J. H. Wright, president of Libbey Glass and H. S. Wade, president of the Owens-Illinois Pacific Coast Co. have been named vice presidents of Owens-Illinois Glass Co.

Laboratories Relocate

LaWall & Harrisson, firm of chemists, bacteriologists, and pharmacologists, have moved their laboratories and office to 1921 Walnut Street, Philadelphia 3, Pa.

Penn Salt Opens Agricultural Sales Division

The Pennsylvania Salt Manufacturing Co. has established within its organization a new sales division known as the Agricultural Chemicals Division. Leonard T. Beale, president of the Company announced that in the near future new agricultural items will be added to the company's present list which includes such products as cryolite and other insecticides, sodium, chlorate and arsenical weed killers.

Sharples Moves

Sharples Chemicals. Inc., has moved its executive offices to larger quarters located in the Fidelity-Philadelphia Trust Building, 123 Broad Street, Philadelphia.

To Open New Rubber Units

The B. F. Goodrich Co. will establish manufacturing operations in DuBois, Pa., shortly after January 1, to manufacture products in which rubber and textiles are employed. The manager of Akron factory employment, A. J. Baker, will be plant manager in DuBois.

B. F. Goodrich has also announced its intention to build a new tire manufacturing plant in Miami, Okla., and construction work will be started there after January 1.

Textile Service Expands

Textile Service, Inc., recently announced the purchase of Bosson & Lane, Inc. The statement also reported that the name of the firm, Textile Service, Inc., has been changed to Textile Service and Chemical Corp.

Calco Buys United Color

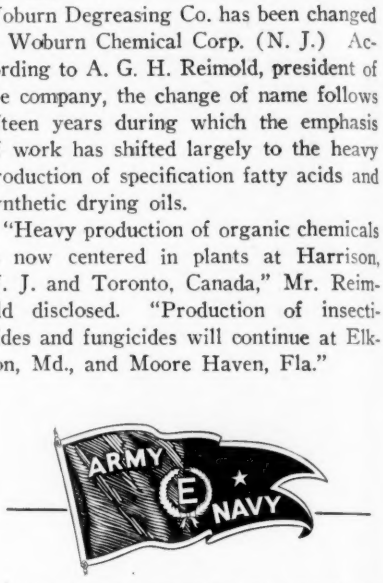
Calco Chemical Division of American Cyanamid Company has purchased the United Color and Pigment Division of Interchemical Corporation, it was announced recently. United has manufacturing facilities at Newark, N. J., employing 500 persons in the production of organic and inorganic chemical colors.

According to the Calco statement the new unit will be known as United Color and Pigment Department, Calco Chemical Division, with "no change of management, personnel or policies contemplated."

Oil, Fat Company Changes Name

To conform more closely with the present nature of its business, the name of Woburn Degreasing Co. has been changed to Woburn Chemical Corp. (N. J.) According to A. G. H. Reimold, president of the company, the change of name follows fifteen years during which the emphasis of work has shifted largely to the heavy production of specification fatty acids and synthetic drying oils.

"Heavy production of organic chemicals is now centered in plants at Harrison, N. J. and Toronto, Canada," Mr. Reimold disclosed. "Production of insecticides and fungicides will continue at Elkton, Md., and Moore Haven, Fla."



The following companies have recently been awarded the Army-Navy "E" for excellence in production of war materials.

Army, Navy "E" Awards

Amarillo Helium plant, Bureau of Mines, Amarillo, Tex.

Du Pont de Nemours & Co., Inc., E. I., Explosives Dept., Wabash River Ordnance Works, Terre Haute, Ind.

Taylor Leaves Wyandotte Chemicals

I. H. Taylor, vice-president in charge of sales of Wyandotte Chemicals Corporation and well-known in the heavy chemical industry, has relinquished his position to devote his efforts to Merchants Chemical Company, of which he is president and principal stockholder. E. M. Ford, president of Wyandotte Chemicals, presented Mr. Taylor with a commemorative scroll at a luncheon honoring him.

Excell Helium plant, Bureau of Mines, Amarillo, Tex.

Hooker Electrochemical Co., Niagara Falls, N. Y.—Second star added to flag.

Niagara Alkali Co., Niagara Falls, N. Y. —Star added to flag.

ASSOCIATIONS

Rubber Division to Meet

The spring meeting of the Division of Rubber Chemistry of the American Chemical Society will be held in New York, N. Y., on April 26, 27, and 28, separate from the 107th meeting of the parent society, according to an announcement from the officers and executive committee of the Division of Rubber Chemistry. The American Chemical Society meeting was scheduled to be held in Cleveland, Ohio, from April 3 to 7, but after a careful study of housing facilities in Cleveland. the executive committee of the Division of Rubber Chemistry decided in view of the continuing problems of transportation and housing accommodations, to hold the meeting of this division again in New York.

The consumption of rubber in the United States in 1943 was about 424,000 long tons, while the consumption in 1944 will be about 757,000 long tons, according to estimates by the Office of the Rubber Director, of which most of the latter tonnage will be synthetic rubber. Putting this increased tonnage of synthetic rubber to the best use will be the subject of many of the papers presented at this meeting.

T.A.C. Cooperates on Army-Navy Paint Problems

The Technical Advisory Committee of the Federation of Paint & Varnish Production Clubs has been set up as an agency to cooperate with all branches of the Army and Navy and the Bureau of Standards to offer suggestions and, where necessary, to put through the laboratory the various test methods in the proposed specification as well as make sure that a commercially acceptable paint can be prepared under the specification.

At the present time, the majority of the specifications being written are those of the various branches of the Army and Navy and the National Bureau of Standards. Many of these agencies do not have the time or the manpower to evaluate the new specifications thoroughly.

The following men have been selected as the steering group of the committee:

Francis Scofield, Baltimore; Walter F. Kuster, New England; John C. Moore, Philadelphia; Otto Milletti, Louisville; John A. Murphy, New York; Harry Eastwood, Golden Gate; Jos. J. Mattiello, Federation President—Ex Officio.

In addition, working committees have been set up in a number of localities to handle the actual work in evaluating various classes of specifications. The groups presently established, with their chairmen, are as follows:

Varnishes, Fred Heniewich, C. D. I. C.

Synthetic Enamels, Robert E. Prince, Chicago.

Oleoresinous Enamels, E. H. Kroepel, New England.

Emulsions, Ken. Howe, New York.

Exterior Paints, Ed. Schulte, Cleveland.

Water Paints, Carl Iddings, New York.

Hydrocarbon Solvents, Bill Colio, Philadelphia.

Lacquer Solvents, Bill Wright, New York.

Lacquers, Robert T. Hucks, New York.

Post-War Tin Markets

An important feature of a post-war plan for tin production given in recently published report by John Ireland, Director of the Tin Research Institute, Middlesex, England, is the establishment of Information Bureaus in all the important tin consuming centres throughout the world. These bureaus will be staffed by practical experts ready to go into works and put any tin consuming process into first class working order in the light of the most

recent scientific knowledge. The experience gained in giving this type of service in Great Britain, and on a smaller scale in the U. S.. has proved that there is a widespread need for it even in these areas where manufacturing technique is highly developed; and in other consuming countries there is even greater scope.

The major problem facing the industry is to build up an organization which will create a market sufficiently wide to maintain producers at a reasonable level of activity. This requires a consumption approaching 250,000 tons of tin annually.

PERSONNEL

Penn Salt Changes

Robert W. Kress, formerly with the Research Department, Follansbee Steel Corp., has been assigned to the Chicago office, Special Chemicals Division, Pennsylvania Salt Manufacturing Company.

The salt company has also announced the retirement of North Emory Bartlett as vice president. Mr. Bartlett started with the concern November 10, 1894, as a lye salesman in the Chicago office. Michael B. Dwyer, district sales manager in charge of the St. Louis office of the Pennsylvania Salt Manufacturing Company, has also retired from active duty.

Donald W. Graham, who has been with the company for 13 years, comes from the Chicago office to succeed Mr. Dwyer as district sales manager at St. Louis.

PHILIP A. LAWRENCE has been appointed purchasing agent of Nicaro Nickel Company and Cuban-American Manganese Corporation, subsidiaries of Freeport Sulphur Company, it was announced by Langbourne M. Williams. Jr., president of Freeport Sulphur Company.

MILTON KUTZ has returned to the post of acting assistant general manager of the Electrochemicals Department of E. I. duPont de Nemours & Company effected by a recent appointment. Ill-health forced him to relinquish the position 18 months ago.

Garbo Named Manager

Mr. P. W. Garbo was recently made manager of the Division of Sponsored Research at the Institute of Gas Technology in Chicago. At the same time Mr. Benjamin Miller was named chairman of the Division of Education and Basic Research.

W. M. STEARS, manager of trade relations and special contracts of the General Electric Co. has retired after 39 years of service according to an announcement by E. O. Shrever, vice president of the company.

FRANCIS J. BYRNE, assistant director of the Du Pont Public Relations Department, has been retired at the age of 65 after 27 years of service with the company.

R. C. MCNEELEY has been appointed to direct the advertising of the Ansul Chemical Company, Marinette, Wisconsin, it was announced by H. V. Higley, president of the company.

PHIL RISING has retired from active service as manager of the Chicago branch office of the Chas. Pfizer & Co. after 45 years of continuous service. He will continue to serve the company as a member of the Board of Directors. NORMAN A. GRIMM, assistant manager of the Chicago branch, will assume management of the office.

DR. WILLIAM J. GILBERT is now associated with the biological division of Commercial Solvents research department through a recent appointment. Dr. Gilbert is a mycologist and botanist.

DAVIS BLACKWELDER, chemical engineer, has been appointed chief engineer of the Reynolds Metals Co. in Richmond, Va. He was previously connected with E. Sirrine and Co.

V. N. CRASNOFF, authority on sporting and military ammunition, has been named assistant general superintendent of Western Cartridge Co., according to an announcement by F. A. Scotters, Supt.

OBITUARIES

DR. RUSSELL HENRY CHITTENDEN, physiological chemist, former director of the Yale University Sheffield Scientific School, and discoverer of glycocoll and glycogen in the free amino acid of living tissue died December 26 in his eighty-eighth year.

ROBERT R. DAVIES, manager of the Detroit sales office of the Harshaw Chemical Company, died November 6.

DR. JOHN S. FONDA, assistant director of sales of the Grasselli Chemicals Department of E. I. du Pont de Nemours & Co.. died in Wilmington, Del., December 22, at the age of 42. Death resulted from a heart attack due to complications growing out of pneumonia.

GEORGE L. T. GIBB, 69, who retired in 1940 after forty-two years as a chemist and metallurgist with the Baker & Co. laboratories in Newark, died at Millburn, N. J., January 5.

MAJ. GEN. HARRY LORENZO GILCHRIST, former chief of the Chemical Warfare

Service, died December 26 at Walter Reed Army Hospital, at the age of 73.

GUY CLEMENS HOWARD, who had been associated with the Marathon Paper Mills Company on special development work since 1927, died Dec. 19.

JAMES T. PARDEE, former chairman of the board of directors of the Dow Chemical Company, died at his home in Midland. Mich., January 3. He had been in poor health since his retirement in 1941. His age was 76.

HENRY B. PRATT, vice president of the B. G. Pratt Company, manufacturing chemists, died in Hackensack, N. J., at his home December 21 at the age of 70.

WILLIAM H. STANTON, former director and works manager of the Philadelphia Quartz Company, died December 11 at the age of eighty-three. He had been associated with the quartz company since 1889.

NEWS OF SUPPLIERS

GIRDLER CORPORATION, Gas Processes Division has appointed Leon E. Osmer, formerly with Semet Solvay Engineering Corp., and Melvin H. McKinney, previously connected with Dow Chemical Co. and Sinclair Rubber Co., to the engineering staff of the organization.

CRANE COMPANY recently promoted James A. Dwyer to the position of general manager of sales and branches of the company with headquarters in Chicago.

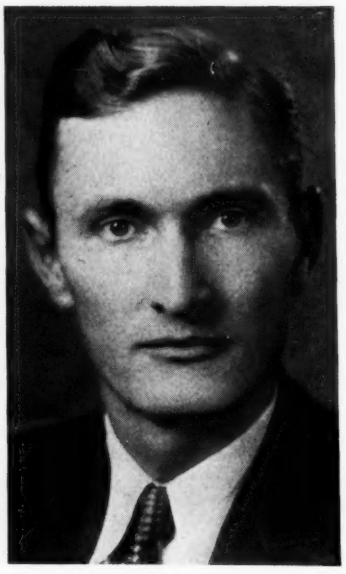
TITEFLEX METAL HOSE COMPANY will hereafter be known as TITEFLEX, INC. Since 1914, the Titeflex Metal Hose Co. has specialized in the manufacture of flexible metallic tubing for the conveyance of fluids and gases for general industrial and automotive application. More recently, Titeflex, Inc. has become a large producer of radio and ignition shielding for aircraft and automotive engines.

CROWN CAN COMPANY'S, Madison, Wis., plant is being moved to Chicago. The company's new Chicago plant is a two-story structure located at the intersection of Central Park Avenue and West 31st Street and is on the Chicago Belt Line, Crown Can will establish its midwest sales offices in Chicago. The territory will be under the supervision of Heber Atkins, who formerly made his headquarters in Fort Wayne. A. D. Harrigan, plant manager at Madison, will continue in that capacity at Chicago. Fred W. Jallings will be office manager.

LINK-BELT COMPANY announces the following personnel changes: E. L. Berry, vice-president and general manager of Link-Belt Ordnance Co., has been elected vice-president of Link-Belt Co., the parent organization. Richard F. Bergmann, company chief engineer, has been elected a vice-president of Link-Belt Co., with headquarters at the company's general office, Chicago, John E. Martin has been appointed manager of Link-Belt Ordnance Co., with headquarters at the plant.

The Oceco Division of THE JOHNSTON & JENNINGS CO., has announced the appointment of GENERAL METERS & CONTROLS CO., 205 West Wacker Drive, Chicago, Ill., as representatives in the Chicago territory.

Carnation Appoints New Director



Dr. E. B. Oberg has been appointed Director of the Carnation Company's recently expanded research laboratory at Milwaukee, Wisconsin. His previous connections were with the United States Gypsum Company and Central Soya Company. His work has dwelt primarily with the industrial uses of starches, gums, casein, and soy protein.

INDUSTRIAL TRENDS

STEEL: Steel production during week ending Jan. 8 is scheduled at 99.6 per

cent of capacity, according to the American Iron and Steel Institute, an increase of 3.7 points over last week's rate of 95.9 per cent. One month ago the rate was 99.3 per cent. In the same week of last year it was 98.12 per cent, up 2.3 points, and two years ago it was 95.1 per cent, up 1.4 points.

ELECTRICITY: Daily average electric power production increased contra-seasonally during week ending Jan. 1 and the adjusted index rose to 157.8 from 154.8. The figure for the week ended Jan. 2, 1943, was 142.0.

CRUDE OIL: Daily crude oil output recorded another slight drop from 4,362,500 to 4,357,300 barrels during week ending Jan. 1.

GASOLINE: Gasoline supplies on the Atlantic Coast declined during week ending Jan. 1 but stocks of both light and heavy fuel oils increased, according to the American Petroleum Institute. The institute's index of gasoline stocks at the close of the week stood at 42.5, against 43.2 a week earlier. The light fuel oil index advanced to 84.1 from 80 and that of heavy fuel oil to 68 from 66.9. The indices are based on stocks in 1940 and 1941.

BUSINESS BAROMETERS: Bank clearings in 22 cities outside of New York, although affected by the New Year holiday, rose to $3,979,941,000 from $3,789,334,000 in the preceding holiday week and recorded a wide margin over the comparable week of last year.

COAL: Bituminous coal production increased from 9,450,000 to 10,350,000 tons.

COMMODITIES: Commodity and stock market prices were higher in the week of Jan. 7. The wholesale food price index dropped 1 c. to $3.99, the lowest since December 8, 1942. The wholesale price index of 30 basic commodities compiled by Dun & Bradstreet in collaboration with the United Press Associations for the years 1932-43 shows:

	High	*Low*
1943....	173.30 Oct. 15	166.61 Jan. 2
1942....	166.02 Dec. 30	151.54 Jan. 2
1941....	150.54 Dec. 12	123.03 Feb. 17
1940....	124.84 Dec. 31	112.42 Aug. 19
1939....	124.19 Dec. 18	101.40 July 24
1938....	117.06 Jan. 10	102.43 June 2
1937....	158.26 Apr. 5	114.83 Dec. 30
1936....	142.65 Dec. 31	115.13 May 27
1935....	124.83 Oct. 8	116.22 Mar. 18
1934....	121.58 Dec. 31	101.05 Jan. 3
1933....	113.25 July 18	69.55 Dec. 24
1932....	84.41 Jan. 7	67.86 Jan. 20

(1930-1932=100)

Chemical Company Earnings

Company	*Period*	**Taxes** *1943-1942*	**Net Profit** *1943-1942*
Canadian Industrial Alcohol Co., Ltd.	Year to Aug. 31	$514,522-$556,897	$536,595-$554,860
Liquid Carbonic Corp.	Year to Sept. 30	.....	$1,309,935-$1,402,495
National Chemical & Manufacturing Co.	Year to Sept. 30	.....	$76,528-$82,861
Squibb (E. R.) & Sons and Domestic and Canadian Subsidiaries	Sept. Quarter	$1,003,258-$492,710	$1,003,258-$471,628
Vick Chemical Co. and Subsidiaries	Sept. Quarter	$1,905,003-$1,198,665	$1,262,574-$1,335,689

LEGAL ADVENTURES OF A CHEMIST

Wherein Chemist Smith, mythical chemist-manager of a small chemical manufacturing concern, records for any who may be interested an account of his many and varied adventures with the law

15. Case of the Selling Expenses

"YOU SIGNED a written agreement to buy $5,000 worth of chemicals from me, failed to take delivery, and I had to sell for $4,000," Chemist Smith complained.

"And I'll pay you the $1,000 difference as damages for my breach of the contract," the customer offered.

"And I paid $150 insurance, $300 storage, and $150 for expenses in connection with the sale," Smith added.

"Well, $1,000 is all I pay—if you want more you'll have to sue," the customer retorted. Chemist Smith accepted the challenge, and the Michigan Supreme Court in the case of Piowaty vs. Sheldon, in 167 Mich. 218, ruled in his favor.

"In the United States the rule is well settled that where the goods are in his possession the seller may, without committing a breach of the contract, resell the goods, if the original buyer refuses without justifiable cause to receive and pay for them, and may recover the loss sustained in the difference between the contract price and the price received on resale, and the expenses of making resale and, in addition, the cost of storage, interest, and an allowance for his time as agent in reselling," said the Court.

16. Case of the Optional Delivery

A NEW CUSTOMER had ordered chemicals from Chemist Smith and the order blank specified "delivery, August-September-October." The customer demanded no chemicals during the month of August, and Smith tendered none but in the month of September Chemist Smith tendered part of the order, which the customer refused to accept.

"The order meant that part of the chemicals were to be delivered in each month, and when the first month went by without any delivery, that cancelled the contract," the customer contended.

"No, I could deliver all the goods any time during October and still fulfill the contract," Chemist Smith argued, and the New York courts in Bahnson & Co. vs. Leaf, reported in 197 New York Supplement, 160, ruled in his favor.

"It would be in harmony with the language used that it was intended to give the option to the seller. to deliver the goods at any time during the three months mentioned," was the reasoning of the Court.

New Weatherproofing Adhesive

New adhesive developed by Du Pont & Co., Inc., for weatherproofing paperboard, is said to make it possible to produce fiberboard containers, now meeting Government specifications, well beyond the imagination of the industry two years ago. The new packaging material is made of four to eight sheets of heavily sized paper laminated, or "glued," together with a water-soluble vinyl resin. The containers are fashioned on standard fiberboard box machinery.

Dr. J. S. Fonda, Grasselli Chemicals department chemist, said that some types of the weatherproof box should have postwar value in air transportation because of relative lightness and lack of bulk.

CHEMICAL SPECIALTIES NEWS

Chemical Welding Introduced

A new compound for chemically mending cracked motor parts has been announced by C. W. Sherin, chemical specialties expert of the Du Pont Company. With more radiator leaks and cracked engine blocks resulting from natural wear and tear to plague motorists during the coming winter than ever before, with new automotive parts scarce, and few replacements available when the car develops cracks in the engine head, cylinder walls or motor block, as a result of overheating or freezing, this new mending compound serves as a chemical expedient for mechanical welding.

The compound is simply poured from the container into the radiator, and circulates with the water until it finds the crack and forms a hard internal bond of a durable nature to close breaks promptly.

Paint Industry Elects Everett

The M. J. Merkin Paint Company, of New York, has elected Ralph H. Everett as executive vice-president and general manager. Everett was formerly an executive of the Keystone Varnish Company, and at one time eastern vice-president of the national association of the Paint, Varnish and Lacquer Association.

Packaging Economy Effected

A simplified practice recommendation for household insecticide containers and packages has been approved by the industry for promulgation, according to an announcement by the Division of Simplified Practice, National Bureau of Standards. Effective January 1, 1944, it will be identified as "R-20344."

The recommendation was drafted by a committee of the Household & Industrial Insecticide and Disinfectant Manufacturers in line with plans to increase output and to assist in the program of the War Production Board to assure equitable distribution of containers for esssential uses. The manufacturers are also planning to continue the container and package simplification program after the war in the interest of improved marketing and distribution practices. However, a few changes may have to be made in the sizes of containers and packages for peacetime requirements.

It is estimated that adoption of the current recommendation should result in a saving of approximately 19% of the glass formerly used in the packaging of household insecticides.

Until printed copies are made available, a limited number of mimeographed copies of the recommendation may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington 25, D. C.

Propyl Gallate Experiments Made

A series of experiments have been carried out concerning the anti-oxidant quality of propyl gallate as described by E. Boehm and R. Williams in the Pharm. Journal 151, 53.

Its effectiveness itself is less than that of pyrogallol, but this latter substance is not always useable as it turns certain materials, such as lard, brown. Propyl gallate is definitely more effective than gallic acid, 10 times more effective than Siam benzoin, and fully 30 times more effective than Sumatra benzoin. For instance lard containing an addition of .05% propyl gallate can be considered adequately preserved.

Hand Sprayer Production Authorized

Enough carbon steel and tin plate has been authorized to permit production of two and a half million insecticide hand sprayers for household use during the first quarter of 1944, the Office of Civilian Requirements has assured consumers.

Action was taken to alleviate a civilian shortage that has been growing more acute since 1941, when production was stopped, and to serve as a check on any possible insect-transmitted diseases. The only metallic hand sprayers produced since the war was an emergency order for a million turned out late this year.

It was expected that the sprayers would be reaching store shelves before the fly and mosquito season begins again in the spring. Co-operating in obtaining action was the Chemicals Division of WPB.

Cowles Appoints MacMullen

The Cowles Detergent Company, of Cleveland, O., has announced the appointment of Dr. Clinton W. MacMullen as Technical Director, in charge of their expanding research and technical service programs. MacMullen comes to Cowles from the Rohm & Haas Company.

Anti-Freeze Committee Chosen

The following members were appointed to the Industrial Advisory Committee for the anti-freeze industry:

Government Presiding Officer: F. E. Bennett. Committee members are: Horace Burrough, New England Alcohol Company, Everett, Massachusetts; James Park, Standard Alcohol Company, New York, N. Y.; James Cook, William S. Gray & Company, New York, N. Y.; William F. Reich. Jr., Carbide & Carbon Chemicals Corp., New York, N. Y.; John Griffin, Publicker Commercial Alcohol Company, Philadelphia, Pennsylvania; Elmer Schumacher, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware; Lee Keane, U. S. Industrial Chemicals, Inc., New York, N. Y.; J. A. Wesseler, Commercial Solvents Corporation, New York. N. Y.

The first meeting of this committee was held December 8, 1943.

Fertilizer Prospects Good

During the year ending June 30, 1944, more fertilizer will be produced, distributed, and used on American farms than in any previous year, according to figures

published by The National Fertilizer Association, indicating a total consumption of all kinds of fertilizer in excess of 11,000,000 tons. Last year's consumption was about 10,500,000 tons; in 1940 it was less than 8,000,000 tons. The Association represents nearly 400 active member companies, operating more than 500 of the country's 900 fertilizer mixing plants. Government agencies give assurance that 625,000 tons of actual nitrogen will be available for fertilizer use this year—35 percent more than last year. Of this total, 271,000 tons will be available for side and top dressing, 354,000 tons for use in mixed fertilizer.

There will be about as much nitrate of soda for direct use as last season. Ammonium sulfate will be used entirely in mixing fertilizers except in the West where it will be available for direct use or for mixing, but there will be larger supplies of cyanamid, uramon, and ammonium phosphate than in either of the past two years. There will also be calnitro, formerly imported from Norway and Germany and now produced in this country.

Production of superphosphate has been increasing steadily month by month in existing plants, some stand-by plants have been reopened, and construction of some new plants has been authorized. Production of normal superphosphate in 1942 was 5,144,484 tons basis 18 percent. The present rate of production indicates a total output of over 6,500,000 tons for 1943-44. It is estimated that about 6,000,000 tons of this will be distributed by the fertilizer industry in mixed fertilizer and as superphosphate, and the rest by AAA in its grant-of-aid program. About 300,000 tons of concentrated superphosphate will be produced, something more than a third of which will probably be exported under Lend-Lease.

Domestic potash plants are producing about 700,000 tons of actual potash this year as compared with about 380,000 tons produced in 1940.

Compound Removes Gummed Paper from Plastics

A solution to the troublesome problem of removing gummed paper from plastic glass sheets and formed parts is offered by Turco Products, Inc., manufacturers of a chemical compound formulated for this special job.

Heretofore, aircraft factories have experienced considerable difficulty in removing the tightly glued masking paper which covers the sheets and formed parts when they are delivered from the manufacturer. If this glued paper is allowed to remain on the plastic for any length of time—or is exposed to heat or sunlight—the paper vulcanizes to the plastic glass and virtually becomes a part of it. Naphtha solvents when used for this purpose often cause "crazing."

Removal of the masking paper with the new compound, Turco Plasti-Clean, however, is a safe and thorough method, according to the manufacturer. Plastic sheets and formed parts are simply soaked in a tank full of the compound until the gummed paper is loosened—when it is easily peeled off. Turco Plasti-Clean is recommended for Plexiglas, Lucite, Plastacele, Acetate, Pyralin and all transparent plastic glasses.

Mercury Fulminate Dermatitis

To reduce the incidence of mercury fulminate dermatitis in the explosives industry, two workers in the U.S. Public Health Service have produced a liquid soap which, by a change in colour, shows, the presence of traces of the mercury compound upon the skin. Details of the composition of the soap are given in "Public Health Reports," 1943, 58, 1183 (through the "Pharmaceutical Journal").

The soap contains:—diphenylthiocarbazone 0.18 gram, triethanolamine 250 cc., liquid soap 750 cc., hydroquinone 0.015 gram. The soap is orange in color and in the presence of traces of mercury salts it changes rapidly to a deep, easily recognizable purple. The triethanolamine brings the mercury fulminate into solution and the change of color is produced by reaction with the diphenylthiocarbazone. One drop (about 0.05 cc.) of the reagent soap solution will indicate the presence of 2—10 (0.000002 to 0.00001 gram) of mercury ion sq. cm.

Forms Pitch Producing Firm

A new company, G. S. Ziegler & Co., was recently formed for the production of articles from stearine pitch and gilsonite. Its offices are in the Woolworth Building, New York City. Formerly vice president and general manager of the Allied Asphalt and Mineral Corp., G. S. Ziegler will head the new concern.

A well-equipped plant with production facilities sufficient to make it a major producer of stearine pitch compounds is already operating at New Market, N. J., under the management of Donald C. Nelson, formerly plant manager for Allied Asphalt and Mineral. Other executive posts include Oren G. Clement as sales manager and William C. Farrell as traffic and purchasing manager.

Chemetics Expands

Evans Chemetics, Inc. has leased several thousand square feet of space in the Long Island University Building, N. Y. The additional space is required in order to fulfill the company's contracts for additional production.

Hollingshead Appoints

E. O. Andrews has been named manager of the household products division of the R. M. Hollingshead Corp. Mr. Andrews was sales manager of the Midway Chemical Company.

Joins Nopco Staff

A. W. "Bick" Hughes has joined the staff of the Special Markets Division of National Oil Products Co. "Bick" will represent Nopco in parts of the midwest territory.

WAR REGULATIONS SUMMARY

ALUMINUM — Ceiling on aluminum scrap and secondary aluminum ingot at the producer level is reduced by 1½ cents per pound. MPR 2, Amendment 3, December 23, 1943.

CELLULOSE PLASTICS — Depletion of phthalate plasticizer stockpiles has resulted in instructions to plastic manufacturers that alternate, less critical plasticizers must be used for material for marginal civilian uses, and that the formulations may not contain more than 10 per cent phthalate plasticizer.

CHESTNUT EXTRACT — Increased, maximum prices from $2.50 to $3.10 per hundred pounds established for six manufacturers of the liquid extract. Previous maximum price holds for other manufacturers. MPR 352, Amendment 1, effective January 15.

COAL TAR—Exemption from present maximum prices is made where a "participating contract" is involved and where OPA may issue special orders pertaining to contracts in which the seller agrees to barter coal tar for fuel oil. MPR 447, Amendment 2, January 11, 1944.

COAL TAR—A number of types of users of coal tar have been relieved of the necessity for filing monthly applications for allocations. Supplies may be obtained in any quantity without application for use in lining steel ingot molds or preserving fish nets. Users who consume 1,000 gallons or less per month for any purpose also are relieved of filing application. Conservation Order M-297 revised December 23, 1943.

COBALT — Restriction on delivery and sale eliminated, but vendors of 1,000 pounds per month are required to report sales during that month on Form WPB-3454. Order M-39, amended December 30, 1943.

CYANIDE—Deliveries, acceptances and uses restricted on any grade or mixture of sodium cyanide or solutions of sodium cyanide containing 20 per cent or more of cyanide by weight. Orders of 1,000 pounds or less per month from all sources are exempted. Allocation Order M-366, effective February 1.

FERTILIZERS—Price differentials established for multiple grades of fertilizer that may be produced at the manufacturers' discretion. Second Revised MPR 135, Amendment 1, January 11, 1944.

INSECTICIDES —"DDT," a substitute for pyrethrum in the manufacture of some insecticides, has been placed under allocation by adding it to Allocation Order M-340. "DDT" is the trade name of 2,2-Bis (parachlorophenyl) 1,1,1-trichloroethane.

INTRA-COMPANY DELIVERIES—Deliveries made from one division or plant to another within the same company are not subject to the order-placing requirements established in Direction No. 1 to Priorities Regulation No. 18.

LEAD—Consumers permitted to make quarterly rather than monthly reports hereafter. Order M-38 amended December 23.

MOLASSES—Quantity of molasses permitted in manufacture of yeast increased from 120 to 130 per cent of each manufacturer's base.

POLYSTYRENE AND PHENOLIC PLASTICS —Because of shortages of benzene, one of the raw materials of polystyrene and phenolics, marginal civilian uses of these plastics may be curtailed partially or completely during the next six months. Applications for such uses will be scrutinized carefully from three standpoints: (1) efficient usage of the material; (2) essentiality of the product for civilian economy; and (3) availability of alternate materials.

ROSIN—Because of increasing costs due to the increase in price of gum rosin, rosin size manufacturers have been permitted to increase the maximum prices for their products by the actual amount of increase in acquisition costs of gum rosin between March, 1942, and the selling date of the rosin size. Rev. Sup. Reg. No. 14 to GMPR, Amendment 70, December 29, 1943.

ROTENONE—Manufacturers of certain finished rotenone insecticides are now permitted to charge no more than (1) their March 1942 ceiling or (2) their 1941 price plus increased cost of materials, whichever price is lower. MPR 298. Amendment 4, January 14, 1944.

SMALL ORDER EXEMPTIONS— Increases in small order exemptions have been made for a number of products under allocation. The products and the new maximum quantities per month exempted are as follows:

Aluminum chloride, anhydrous	600 lbs.
Calcium carbide	30 tons
Copper carbonate	1,000 lbs.
Copper chloride	1,000 lbs.
Copper cyanide	1,000 lbs.
Copper sulfate	4,000 lbs.
Cupric oxide	1,000 lbs.
Formaldehyde, 37% sol.	10,000 lbs.
Furfural	110 gals.
Hexamethylenetetramine	10,000 lbs.
Methanol	540 gals.
Methyl abietate	5,000 lbs.
Methyl abietate, hydrogenated	5,000 lbs.
Pentaerythritol	100 lbs.
Phosphate plasticizers	1,000 lbs.
Phosphorus	10,000 lbs.
Phthalate plasticizers	220 gals.

or less of all kinds, consisting of not more than 110 gallons of any one kind of Group 1 and not more than 55 gallons of any one kind from Group 2.

Potash	5 tons

TITANIUM DIOXIDE—Preference Ratings below AA-2 for pure titanium dioxide have been voided except on military orders. Purchases on military orders are required to be so certified. Non-military orders not bearing an AA-2 rating are to be filled as non-rated orders to the extent that supplies are available. Conservation Order M-353, December 6, 1943.

TITANIUM DIOXIDE—Barium and calcium base extended titanium pigments and titanated lithopone are now included within the scope of Conservation Order M-353 which covers distribution of titanium dioxide. Only pigments containing more than 30 per cent titanium dioxide have been included heretofore. The amended order reduces the percentage to 12 per cent and removes the word "pure" from the definition of titanium dioxide.

TOTAQUINE—Maximum base price for sales by primary distributors increased to 52 cents per ounce. MPR 278, Amendment 2, January 5.

VANADIUM—Restrictions on sale and delivery eliminated, but vendors of more than 500 pounds in any month must report sales during that month on Form WPB-3454. Order M23-a, amended December 30, 1943.

WAXES—Ceilings for sales in the United States of imported industrial waxes are now calculated upon war risk insurance rates for certain areas not listed previously as potential supply areas.

ZINC DUST—Amount which may be purchased without authorization has been increased by about 50 per cent. The requirement that consumers forward allocation certificates to the supplier for endorsement is also eliminated. GPO M-11-1 amended, December 13, 1943.

ZINC OXIDE—The lead-free product placed under allocation and limited to a list of permitted uses. Deliveries of two tons or less are exempted from allocation but must be for a permitted use. Order M-11-A amended, December 29.

Devoe Receives "M"

Devoe & Raynolds Co., Inc., one of America's oldest paint manufacturers, has been awarded the United States Maritime Commission "M" Pennant and Victory Fleet Flag for excellence in production. The presentation was made at the Malden, Mass., plant of the company.

MARKETS IN REVIEW

INDUSTRIAL chemical production stays around peak levels for the war and gives little indication of an approaching transition period. Government controls also have not been modified in any important respect; in one important instance, the synthetic resins group, the WPB is planning to tighten its allocations.

The new Federal Reserve Board Index reveals that industrial chemical output, after an uninterrupted series of increases during the 1942-1943 period, touched a new high of 401 in November (preliminary) compared with 396 in October and 383 in September. In one year the index has scored a rise of 91 points, while non-durable manufactures as a group advanced only 11 points.

It cannot be overlooked, however, that there are a number of unfavorable factors of recent development which may place a brake on chemical manufacturing activity at any time. Just when the industry felt that it had passed the worst phase of the manpower problem, and that it might struggle through with inadequate operators, plant and shipping staffs, the War Manpower Commission decides it will do nothing further in extending draft deferment to chemical workers.

Cutbacks in other industries also are not helpful. The lessened flow of spent acid from ordnance plants already is making its effects felt at superphosphate plants. There is also a tank car deficiency to contend with in that situation.

Other uncertainties which face chemical production in 1944 are technological changes which are proceeding at a fast rate in the production and use of chemicals, and obsolescence of weapons and other war material which may necessitate rapid changes in the processing of these products. Containers are certain to afford more rather than less trouble this year, especially those made from paper or wood.

Insecticides. The Department of Commerce recently pointed out that the outlook for this group is in many respects better than in 1943. For one thing it was shown that there is a carryover supply of calcium arsenate, used against the boll weevil, that should figure in a larger 1944 overall supply. The industry, however, is not so well off with regard to arsenical supplies as this would indicate.

While the carryover stock of calcium arsenate is 67 per cent greater this year, it is 40 per cent lower than the 1936-1940 yearly average. The arsenic allocations for the last quarter of 1943 were lower than the WPB had planned and what the industry had requested. The lead arsenate producers have programmed an increase of 12½ per cent with production winding up June 15, 1944. Again reduced allocations stand in the way, along with the handicap of poor raw arsenic qualities. The industry has been promised additional materials for the first and second quarters of 1944, and manpower permitting, will make a genuine effort to make up for lost time.

Rotenone supplies remain critically short, which is understandable in a commodity normally obtained abroad. Consumers now denied their regular quantities are using instead cryolite, arsenic and synthetic compounds as extenders and activators. Pyrethrum, ingredient in fly sprays, is likewise restricted owing to its use by the Army for mosquito control.

Synthetic Resins. Plant strikes in the butyl alcohol industry have had the effect of tightening the allocations picture for cellulose acetate and cellulose acetate butyrate. Stockpiles of phthalate plasticizers have been heading downward, and instructions have gone out to manufacturers to employ less critical plasticizers in materials intended for marginal civilian uses. Some formulations may not contain more than 10 per cent of the phthalates. Butyl alcohol stocks ran down to very low levels during the plant tie-up; currently are being built up again.

Meanwhile, Washington officials view the outlook for resin materials more hopefully for the long term. It is expected that phenolic resin production will be stepped up 25 per cent, and it is assumed that this estimate is based on adequate supplies of phenol over 1944. Through the erection of new capacity, phenol production has been brought up to an estimated 200,000,000 pounds annually, as compared with 145,000,000 pounds in 1942, and 115,000,000 pounds in 1941. The key to the phenolics situation, however, is more likely in benzol supplies, which are being increasingly drawn upon for styrene and aviation fuel manufacture.

According to best estimates, all plastics production in the United States is now something under 300,000 tons, a figure which probably includes polyvinyl chloride and some of the vinyl polymers serving in the place of rubber. Transition of industry to peace is certain to introduce an era of competition between plastics and light metals despite contentions that the two groups are largely non-competitive. In this respect the position of the resin materials has been greatly strengthened through technological development, such as high-frequency heat molding, low-pressure fabrication of phenolics, laminations with paper and textiles for high strength, and the introduction of extrusion procedure in the polystyrene field.

Vitamin production continues to expand steadily in order to meet the requirements of the military services, Lend-Lease, and civilians. Consumption by the latter group is rising, even in face of an apathetic attitude by the medical profession, and the promotional efforts of the pharmaceutical and food industries are more than offsetting arguments against vitamins.

As a result of growing consumption and production, chemical manufacturers have been able to effect further price reductions for the B Complex synthetics. Late in December Riboflavin (B-2) was given another cut to $380 per kilo, the fifth for the year. Early in January manufacturers again pared Riboflavin down to $341.70, for a net reduction of $88.30 per kilo in one week.

Plant economies and rocketting production enabled the industry to slash thiamin hydrochloride (B1) to $250 per kilo, a reduction for the year aggregating $120. In the oil-soluble vitamins, where different manufacturing and cost conditions are encountered, prices remain stable.

Heavy Chemicals. Higher wage levels do not appear to be attracting the additional labor forces sought by the fertilizer industry, now engaged in making up and shipping these essential materials to agricultural sections. More difficulty may be met, therefore, in meeting fertilizer needs in 1944, which are placed by the National Fertilizer Association in excess of 11,000,000 tons, against 10,500,000 tons in 1943. Transportation difficulties now encountered by the industry might tend to grow worse at the height of the spring shipping season. Government agencies assert that 35 per cent more chemical nitrogen will be available than last year, or a total of about 625,000 tons. It will be produced in the form of nitrate of soda, sulfate of ammonia, ammonium nitrate, and ammonia solutions, chiefly. Ammonium nitrate containing 32.5 per cent nitrogen is now being produced in volume by government plants here and in Canada. Aside from fertilizer, mild weather has enabled calcium chloride manufacturers to catch up with deliveries. It is needed for ice control on highways and for construction. Soda ash is moving at a high rate to aluminum plants, and there is also some export demand. Arrivals of British soda ash are not expected to affect the firm market position for this alkali. A

tight supply situation is reported for carbon tetrachloride, sodium hydrosulfite and permanganate of potash. The resale market for caustic soda is a strong affair at $2.75 to $3 per 100 pounds for the solid. Manufacturers of oxalic acid report that their production is sold far ahead into 1944.

Fine Chemicals. Some items in this group, such as citric acid, give indications of a slightly better supply position, but others are worse off in that respect. Scarcities affording buyers some trouble are alkaloids, colchicine, colchicine silacylate, berberine, hyosciene. The needs for quicksilver are less urgent, a development in which the Allied advance in Italy may explain to some extent. Prices meanwhile are held firm here at $190. Consuming manufacturers are said to be finding it harder to obtain necessary quantities of hydrogen peroxide. Drug manufacturers contend meanwhile that allotted supplies of alcohol and sugar are far from adequate for the production of many preparations essential in the cold and flu epidemics. The WPB action last December permitting them to apply for 25 per cent additional alcohol has not relieved the situation in view of extraordinary demands this year for medicinal preparations.

Coal Tar Products. The toluol situation has grown less stringent to an extent owing to lessened explosives demands. There has also been a considerable addition to toluol capacity through the operation of a new California petroleum project. This process may be switched readily from toluene to aromatic compounds or ingredients for motor fuels, and at present is said to be supplying gasoline. The allotments of benzol and phenol have not been increased to consuming plants. To relieve the demand on domestic suppliers, WPB is reported arranging, through other agencies, for the importation of more cresylic acid and other cresols from Britain. The insecticide trade is expected to enter the market early this year for naphthalene, an item which is entering mothproofing compounds on a growing scale. Solvents requirements in a measure are still being met by the recently introduced toluol-xylol blend.

Paint Materials. The shellac situation, amounting to an outright freeze for many consuming lines, is now beginning to thaw out. Quantities are being released for conditioning bowling alleys, and the phonograph record industry has had its 20 per cent shellac allotment increased to 50 per cent. Meanwhile those engaged in the manufacture of replacement materials for shellac, such as zein, expect to retain many of their new outlets for this corn protein derivative. Among the varnish gums, it is noted that demands for Congo copals are not keeping pace with the quantities imported. One explanation in the trade is that synthetic replacements have proved satisfactory for many uses. Lead-free zinc oxide was a strong item among the pigments, and only two tons may be had by a consumer now without resorting to allocations procedure.

Fluorspar Record Set

The domestic fluorspar industry was called upon to supply an unprecedented demand in 1943 and producers responded by producing and shipping 408,000 and 406,000 short tons, respectively, of finished fluorspar, gains of 21 and 13% over 1942, the previous record year, according to the Bureau of Mines, United States Department of the Interior. Production and shipments in 1943 were adequate to cover domestic consumption, which amounted to 386,000 tons, an increase of 7% over 1942.

CURRENT PRICES

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f.o.b. works are specified as such. Import chemicals are so designated.

Oils are quoted spot New York, ex-dock. Quotations f.o.b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f.o.b., or ex-dock. Materials sold f.o.b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both.

Purchasing Power of the Dollar: 1926 Average—$1.00
Jan. 8, 1942 $.0980 Jan. 8, 1943 $.0910 Jan. 8, 1944 $.0890

	Current Market	1943 Low	1943 High	1942 Low	1942 High
Acetaldehyde, 99%, drs. wks. lb.	.11	.11	.14	.11	.14
Acetic Anhydride, drs, ...lb.	.11½	.11½	.13	.11½	.13
Acetone, tks, delv (*PC*) ..lb.	...	...	.07	.07	.158
ACIDS					
Acetic, 28%, bbls (*PC*) 100 lbs.	3.38	3.38	3.63	3.38	3.63
glacial, bbls. .....100 lbs.	9.15	9.15	9.40	9.15	9.40
tks, wks .....100 lbs	...	...	6.93	6.25	6.93
Acetylsalicylic, Standard USP .....lb.	.40	.40	.54	.40	.40
Benzoic, tech, bbls lb.	.39	.39	.47	.43	.47
USP, bbls, 4,000 lbs. up lb.	...	...	.54	.54	.59
Boric, tech, bbls, c-l, ton *a*	...	109.00	...	109.00	108.00 109.00
Chlorosulfonic, drs, wks lb	.03	.03	.04½	.03	.04½
Citric, crys, gran, bbls, lb. *b*	.20	.20	.24	.20	.21
Cresylic 50%, 210-215° HB, drs, wks, frt equal (A)gal.	.81	.81	.83	.81	.86
Formic, Dom. cbys .....lb.	.10½	.10½	.11½	.10½	.11¼
Hydrofluoric, 30% rubber, dms. .....lb.	.08	.08	.09	.06	.06½
Lactic, 22%, lgt, bbls wks lb.	.039	.039	.0415	.039	.0415
44%, light, bbls wks lb	.073	.073	.0755	.073	.0755
Maleic, Anhydride, drs lb	.25	.25	.26	.25	.26
Muriatic, 18° cbys ...100 lb.	1.50	1.50	2.45	...	
20° cbys, c-l, wks ..100 lb.	..	...	1.75	1.75	1.75
22° cbys, c-l, wks 100 lb.			2.25	2.25	2.25
Nitric, 36°, cbys, wks 100 lbs. *c*	5.00	5.00	5.25	5.00	5.00
38°, c-l, cbys, wks 100 lbs. *c*			5.50	5.50	5.50
40°, c-l, cbys, wks 100 lbs. *c*			6.00	6.00	6.00
42°, c-l, cbys, wks 100 lbs. *c*			6.50	6.50	6.50
Oxalic, bbls. wks (*PC*) "	.11¼	.11¼	.12½	.11¼	.14½
Phosphoric, 100 lb. cbys, 75% USP. .....lb.	.10½	.10½	.13	.12	.12
Salicylic, tech, wks (*PC*) lb	.26	.26	.44	...	.33
Sulfuric, 60°, tks, wks ton			13.00	13.00	13.00
66°, tks, wks ton	...	...	16.50	...	16.50
Fuming (Oleum) 20% tks, wks ..... ton	...	19 50	..	19.50	... 19.50
Tartaric, USP, bbls lb.	...	.70½	..	.70½	.. .70½
Alcohol, Amyl (from Pentane) tks, delv .....lb	...	.131	...	.141	... ...
Butyl, normal, syn, tks (PC) .....lb.	...	.10¾	.10¾	.14¼	.10¾ .168
Denatured, CD, 14, c-l drs, (*PC, FP*) ....gal. *d*	...	.54½	..	.54½	... .65
Denatured, SD, No. 1, tks. *d*	...	.50	...	.50	... .53
Ethyl, 190 proof tks....gal	...	11.90	...	11.90	8.12 11.92
Isobutyl, ref'd, drs .....lb.		.086		.086	.086
Isopropyl, ref'd, 91% gal.	.39	.66½	.39	.66½	.40½ .43½
Propyl, nor, drs, wks gal	.67	.70	.67	.70	.69 .75
Alum, ammonia, lump, bbls, wks .....100 lb.	...	4.25	...	4.25	... 4.25
Aluminum metal, (*FP*) 100 lb.	15.00	16.00	15.00	16.00	15.00 16.00
Chloride anhyd 99% wks lb.	.08	.12	.08	.12	.08 .12
Hydrate, light, (A) ....lb.	.14½	.15	.14½	.15	... .14½
Sulfate, com, bgs. wks 100 lb.	1.15	1.25	1.15	1.25	1.15 1.25
Sulfate, iron-free, bgs, wks .....100 lb.	2.35	2.50	1.75	2.50	1.75 1.85
Ammonia anhyd, cyl .....lb.	...	.16	...	.16	16
Ammonium Carbonate, lumps, dms lb.	.08½	.09¼	.08¼	.09¼	.08¼ .09¼
Chloride,whi,bbls,wks,100 lb.	4.45	5.15	4.45	5.15	4.45 ...
Nitrate, tech. bags. wks. lb.	.0435	.0850	.0435	.0850	.0435 .0455
Oxalate pure, grn, bbls lb.	.27	.33	.27	.33	.27 .33
Perchlorate, kgs (A) lb	.55	.65	.55	.65	.55 .65
Phosphate, dibasic tech, bbls .....lb.	.07¼	.08½	.07¼	.08½	.09¼ .09¼
Stearate, anhyd, dms ...lb.	...	.34	...	.34	... .24½
Sulfate, f.o.b., bulk (A) ton	28.20	29.20	28.20	30.00	29.00 30.00
Amyl Acetate (from pentane) c-l, drs, delv .....lb.	...	.18½	...	.18½	... ...
Aniline Oil, drs .....lb.	.11½	.12½	.11½	.12½	.12½ .16
Anthraquinone, sub, bbls. lb.	...	.70	...	.70	... .70
Antimony Oxide, 500 lb. bbls (A) .....lb.	.15	.15½	.15	.15½	.15 .16½
Arsenic, whi, kgs (A) lb.	.04	.04¼	.04	.04¼	.04 .04¼
Barium Carbonate precip. lb, wks .....ton	55.00	65.00	55.00	65.00	55.00 65.00
Chloride, delv, zone 1 ton	77.00	90.00	77.00	90.00	77.00 92.00

USP $25 higher; Prices are f.o.b. N. Y., Chicago, St. Louis, deliveries ½c higher than NYC prices; *y* Price given is per gal; *c* Yellow grades 25c per 100 lbs. less in each case; *d* Prices given are Eastern schedule *a* Powdered boric acid $5 a ton higher; *b* Powdered citric is ½c higher;

	Current Market	1943 Low	1943 High	1942 Low	1942 High
Barytes, floated, bbls. ....ton	...	36.00	...	36.00	...	...
Bauxite, bulk mines (A) ton	7.00	10.00	7.00	10.00	7.00	10.00
Benzaldehyde,tech,cbys,dms lb.	.45	.55	.45	.55	.45	.55
Benzene (Benzol), 90%, Ind. 8000 gal tks, ft all'd gal	(A)	.15	(A)	.15	...	.15
Benzyl Chloride, cbys ....lb.	.22	.24	.22	.24	.22	.24
Beta-Naphthol, tech, bbls, wks .....lb.	.23	.24	.23	.24	.23	.24
Bismuth metal, ton lots lb.	...	1.25	...	1.25	...	1.25
Blanc Fixe, 66 2/3% Pulp, bbls, wks .....ton *h*	40.00	46.50	40.00	46.50	40.00	46.50
Bleaching Powder, wks, 100 lb.	2.50	3.60	2.50	3.60	2.25	3.10
Borax, tech, c-l, bgs ....ton *i*	...	45.00	...	45.00	45.00	46.00
Bordeaux Mixture, drs . lb.	.11	.11½	.11	.11½	.11	.11½
Bromine, cases lb.	.25	.30	.25	.30	.25	.30
Butyl, acetate, norm drs, lb.	.1755	.1840	.1575	.1840	.124	.168
Cadmium Metal (*PC*) lb	.90	.95	.90	.95	.90	.95
Calcium, Acetate, bgs. 100 lb.	3.00	4.00	3.00	4.00	3.00	4.00
Carbide, drs .....ton	50.00	95.00	50.00	95.00	...	...
Carbonate, tech, c-l bgs, ton	18.00	22.00	18.00	22.00	16.00	20.00
Chloride, flake, bgs c-l ton	18.50	35.00	18.50	35.00	...	21.00
Solid, 73-75% drs, c-l, ton	18.00	31.50	18.00	31.50	18.00	34.50
Gluconate, U.S.P., drs. lb.	.57	.58	.57	.58	.52	.59
Phosphate, tri, bbls. cl lb.	.0635	.0785	.0635	.0785	.0635	.0705
Camphor, U.S.P., gran, powd, bbls .....lb.	.68½	.70½	.68½	.70½	...	...
Carbon Bisulfide, 55-gal drs lb.	.05	.05¾	.05	.05¾	.05	.05¼
Dioxide, cyl .....lb.	.06	.08	.06	.08	.06	.08
Tetrachloride (*FP*) (*PC*) Zone 1, 52½ gal, drms .....lb.	.73	.80	.73	.80	.73	.83
Casein, Acid Precip, bgs, 100 or more .....lb.	...	.24	...	.24	.15	.30½
Chlorine, cyls, lcl, wks, contract (*FP*) (A) .....lb.	...	.07¼	...	.07¼	...	.07¼
cyls, c-l, contract ..lb. *j*	...	.05¼	...	.05¼	...	.05¼
Liq, tk, wks, contract 100 llb.	...	1.75	...	1.75	...	1.75
Chloroform, tech, drs ....lb.	.20	.23	.20	.23	.20	.23
Coal tar, bbls, crude ....bbl.	8.25	8.75	8.25	8.75	7.50	9.25
Cobalt Acetate, bbls (A) lb.	...	.83¼	...	.83¼	...	.83¼
Oxide, black kgs (A) .lb.	...	1.84	...	1.84	...	1.84
Copper, metal *FP, PC* 100 lb.	12.00	12.50	12.00	12.50	12.00	12.50
Carbonate, 52-54%, bbls lb.	.19½	.20	.19½	.20½	.18	.20½
Sulfate, bbls, wks(A) 100 lb.	5.00	5.50	5.00	5.50	5.15	5.50
Copperas, bulk, c-l, wks ..ton	...	14.00	...	14.00	...	17.00
Cresol, USP, drs, (A) ... lb.	.10¾	.11¾	.10¾	.11¾	.10¾	.11½
Cyanamid, bgs .....ton	1.52½	1.62½	1.52½	1.62½	no prices	
Dibutylamine, c-l, drs. wks lb.	...	.61	...	.61	.50	.61
Dibutylphthalate, drs .....lb.	.2060	.2300	.2060	.2300	.21	.23½
Diethylaniline, lb drs . lb.	...	.40	...	.40	...	.40
Diethyleneglycol,drs lcl. wks. lb.	.14	.15½	.14	.15½	.14	.15½
Dimethylaniline,dms.,cl.,lcl. lb.	.23	.24	.23	.24	.23	.24
Dimethyl phthalate, drs ..lb.	.1875	.1925	.1875	.2050	...	.20
Dinitrobenzene, bbls .....lb.	...	.18	...	.18	...	.18
Dinitrochlorobenzene, dms lb.	...	.14	...	.14	...	.14
Dinitrophenol, bbls .....lb.	...	.22	...	.22	...	.22
Dinitrotoluene, dms .....lb.	...	.18	...	.18	...	.18
Diphenyl, bbls lcl. wks ....lb.	.16	.20	.15	.20	.15	.16
Diphenylamine bbls .....lb.	...	.25	...	.25	...	.25
Diphenylguanidine, drs ...lb.	.35	.37	.35	.37	.35	.37
Ethyl Acetate, 85% Ester tks, frt all'd .....lb.	.107	.110	.107	.110	.11	.12
Chloride, drs .....lb.	.18	.20	.18	.20	.18	.20
Ethylene Anhydrous frt all'd .....lb.	...	.75	...	.75	...	.75
Dichloride, cl wks ....drs, E. Rockies dms, cl. ..lb.	...	.0842	...	.0842	...	.0742
Glycol, dms, cl. .....lb.	...	.10	...	.10	.14½	.18½
Fluorspar, No. 1, grd. 95-98% bulk, cl-mines .....ton	...	37.00	...	37.00	...	...
Formaldehyde, c-l, bbls, wks (*FP, PC*) lb	.0550	.0575	.0550	.0575	.055	.0575
Furfural tech, dms, c-l, wks lb.	...	.12½	...	.12½	...	.12½
Fusel Oil, refd, dms, dlvd lb.	.18½	.19½	.18½	.19½	.18	.19½
Glauber's Salt bgs, wks 100 lb	1.05	1.25	1.05	1.25	1.05	1.28
Glycerin (*PC*) CP, dms, c-l, ...lb.	...	.18¾	...	.18¾	...	.18½
Saponification, dms, c-l, lcl or tks .....lb.	...	.12¾	...	.12¾	...	.12¾

GUMS

Gum Arabic, amber sorts bgs .....lb.	.13½	.14	.13½	.17½	.14½	.24
Benzoin Sumatra, CS ....lb.	.52	1.00	.52	1.00	.45	.55
Copal, Congo, ...lb.	...	.55¾	...	.55¾	...	...
Copal, East India, chips ..lb.	...	.12	...	.12	...	...
Macassar dust .....lb.	.07⅜	.11¾	.07⅜	.11¾	...	.17⅜
Copal Manila,	.13⅜	.15½	.13⅜	.15½	.14	.14½
Copal Pontianak, bold c-l lb.	...	.23⅜	...	.23⅜	.22½	.22⅞
Ester lb	.09½	.12	.09½	.12	.08½	.10
Karaya, bbls, bxs, dms, ..lb.	.18	.40	.14	.40	.14	.33

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

h Lowest price is for pulp; highest for high grade precipitated; *i* Crystals $6 per ton higher; USP, $15 higher in each case;

Technical -ities

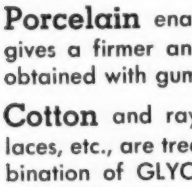
By Ed. Rosendahl

Textile oils used as worsted lubricants, spun rayon stock lubricants, finish and lustre oils for cotton, rayon and other natural and synthetic yarns can economically be made by means of a new synthetic oil called DIGLYCOL LAURATE S. It is produced from domestic raw materials.

Seal for joints and seams which is flexible, leakproof and non-cracking is called GLYCOSEAL. GLYCOSEAL is resistant to benzol, gasoline, diesel oil, butane, propane, pentane and similar liquids and gases.

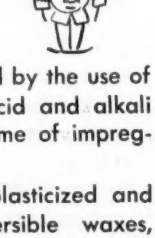
Sintered bearings made with metallic powders have a tendency to stick in the molds. A newly developed lubricant, ACRAWAX C, enables the bearings to be very readily released from the molds.

Rust prevention, lubrication and bright annealing of nickel alloy stampings are obtained by the application of a solution of synthetic wax, called FLEXO WAX C. It gives a water resistant finish. On subsequently annealing the stamping, FLEXO WAX C has a reducing action on the oxides and gives a very bright anneal.



Porcelain enamel frit binder with ABOPON gives a firmer and more lustrous coating than is obtained with gums.

Cotton and rayon braid, shoe laces, etc., are treated with a combination of GLYCO WAX A and FLEXO WAX C to give increased flexibility and high lustre.



Wood warpage can be prevented by the use of FLEXO WAX C which increases acid and alkali resistance as well as decreasing time of impregnation.

Urea formaldehyde resins are plasticized and lubricated by new water dispersible waxes, DIGLYCOL STEARATE S and ACIMUL, which are incorporated in the aqueous phase.

Each Month these and many other uses of our products will be mentioned here. However, you should have a copy of our catalogue, "Chemicals by Glyco," which covers a wide range of product uses. Just send to Glyco Products Company, Inc., 26 Court Street, Brooklyn 2, New York.

Current Prices

Gums
Salt Cake

		Current Market	1943 Low	1943 High	1942 Low	1942 High
Kauri, N Y (A)						
Brown XXX, bgs	lb.	...	.77	...	.77	.60 .77
Pale XXX	lb.	...	.65¼	...	.65¼	.61 .66
No. 3	lb.	...	.22	...	.30	.17¾ .22
Sandarac, cs	lb.	1.40	nom.	1.40	nom.	.95 1.10
Tragacanth, No. 1, cases	lb.	5.00	5.25	4.00	5.25	3.50 4.00
No. 3	lb.	1.10	1.20	1.10	1.20	1.10 1.20
Yacca, bgs (*PC*)	lb.	.06	.07¼	.06	.07¼	.06 .07¼
Hydrogen Peroxide, cbys	lb.	.15½	.18½	.15½	.18½	.16 .18½
Iodine, Resublimed, jars	lb.	2.00	2.10	2.00	2.10	... 2.00
Lead Acetate, cryst, bbls	lb.		.12½		.12½	.12 .13¼
Arsenate, bg, c-l	lb.	.11½	.12	.11½	.12	.11 .12
Nitrate, bbls	lb.	...	.12½	...	.12½	.11 .14
Red, dry, 95% Pb_3O_4, lcl	lb.	.09	.11	.09	.11	.09 .10¼
97% Pb_3O_4, bbls delv	lb.	.09¼	.11	.09¼	.11	.09¼ .09½
98% Pb_3O_4, bbls delv	lb.	.09½	.11¼	.09½	.11¼	.09½ .10½
White, bbls, lcl	lb.	.08¼	.08¾	.08¼	.08¾	... .07½
Basis sulfate, bbls, lcl	lb.	.07¼	.08	.07¼	.08	.06½ .07½
Lime, Chem., wks, bulk	ton	6.25	13.00	6.25	13.00	7.00 13.00
Hydrated, f.o.b. wks	ton	8.50	16.00	8.50	16.00	8.50 16.00
Litharge, coml, delv, bbls	lb.	.08	.09¾	.08	.09¾	.079 .08
Lithopone, ordi., (*PC*), bgs	lb.	.04½	.04¾	.04¼	.04¾	... .04¼
Magnesium Carb, tech, wks	lb.	.06¼	.09½	.06¼	.09½	... .06¼
Chloride flake, bbls, wks c-l	ton		32.00		32.00	32.00
Manganese, Chloride, bbls	lb.	.14	nom.	.14	nom.	.13 .14
Dioxide, Caucasian bgs, lcl	ton	...	74.75	...	74.75	... 74.75
Methanol, pure, nat, drs	gal.	.63	.76	.63	.76	.55½ .61½
Synth, drs cl	gal.	.34½	.40½	.34½	.40½	.34½ .40½
Methyl Acetate, tech tks	lb.	.06	.07	.06	.07	.06 .07
C P 97-99%, tks, delv	lb.	.09½	.10½	.09½	.10½	.09½ .10½
Chloride, cyl	lb.	.32	.40	.31	.40	.32 .40
Ethyl Ketone, tks, frt all'd	lb.	...	.08	...	.08	... .08
Naphtha, Solvent, tks	gal.	...	.27	...	.27	... .27
Naphthalene, crude, 74°, wks tks	lb.	...	.0275	...	.0275	... ...
Nickel Salt, bbls, NY	lb.	.13	.13½	.13	.13½	.13 .13½
Nitre Cake, blk	ton	...	16.00	...	16.00	... 16.00
Nitrobenzene, drs, wks	lb.	.08	.09	.08	.09	.08 .09
Orthoanisidine, bbls	lb.	...	.70	...	.70	... .70
Orthochlorophenol, drs	lb.	...	.32	...	.32	... .32
Orthodichlorobenzene, drms	lb.	.07	.08	.07	.08	.06 .07½
Orthonitrochlorobenzene, wks	lb.	.15	.18	.15	.18	.15 .18
Orthonitrotoluene, wks	lb.	...	.09	...	.09	... .09
Para aldehyde, 98%, wks	lb.	...	.12	...	.12	... .12
Chlorophenol, drs	lb.	...	.32	...	.32	... .32
Dichlorobenzene, wks	lb.	.11	.15	.11	.15	.11 .12
Formaldehyde, drs, wks (*FP*)	lb.	.23	.24	.23	.24	.23 .24
Nitroaniline, wks, kgs	lb.	.43	.45	.43	.45	... .45
Nitrochlorobenzene, wks	lb.		.15		.15	.15
Penetaerythritol, tech, bl	lb.	.29	.33	.29	.35½	.33½ .35½
Toluenesulfonamide, bbls	lb.		.70		.70	
Toluidine, bbls, wks	lb.		.48		.48	.48

PETROLEUM SOLVENTS AND DILUENTS

Lacquer diluents, tks, East Coast	gal.	...	.11	...	.11	...	.11
Naphtha, V.M.P., East tks, wks	gal.	...	.11	...	.11	.10½	.11
Petroleum thinner, 43-47, East, tks, wks	gal.	.08¼	.09½	.08¼	.09½	.08¼	.09½
Rubber Solvents, stand grd, East, tks, wks	gal.	...	.11	...	.11	.10½	.11
Stoddard Solvents, East, tks, wks	gal.	...	.09½	...	.09½	...	.09½
Phenol, U.S.P., drs (A)	lb.	.10½	.11¼	.10½	.13¼	.12½	.13
Phthalic Anhydride, cl and lcl, wks (A)	lb.	.13	.14	.13	.15½	.14½	.15½
Potash, Caustic, wks, sol	lb.	.06¼	.06¾	.06¼	.06¾	.06¼	.06¾
flake, 88-92%	lb.	.07	.07½	.07	.07½	...	.07
liquid, tks	lb.		.0275		.0275		.0275
dms, wks	lb.	.03	.03¼	.03	.03¼	.03	.03¼
Potassium Bichromate cake *(*FP*)	lb.	.09½	.10	.09½	.10	...	.09½
Bisulfate, 100 lb kgs	lb.	.15½	.18	.15½	.18	.15½	.18
Carbonate, hydrated 83-85% calc	lb.	.05½	.05¾	.05½	.05¾	.06½	.06¾
Chlorate crys, kgs, wks (A)	lb.	.11	.13	.11	.13	nom.	.11
Chloride, crys, tech, bgs, kgs	lb.	.08	nom.	.08	nom.	.08	nom.
Cyanide, drs, wks	lb.	...	.55	...	.55	...	.55
Iodide, bots., or cans	lb.	1.44	1.48	1.44	1.48	1.44	1.48
Muriate, bgs, dom, blk unit Per Unit K_2O	ton	.53½	.56	.53½	.56	.56	.58
Permanganate, USP, wks (*FP*) drs	lb.	.20½	.21	.20½	.21	.19¾	.21
Sulfate, 90% basis, bgs	ton	...	36.25	...	36.25	...	36.25
Propane, group 3, tks (*PC*)	gal.	...	.03¼	...	.03¼	.02¾	.03¼
Pyridine, ref., drms	lb.	.45½	.46	.45½	.46	...	.46
R Salt, 250 lb bbls, wks	lb.	...	.65	...	.65	...	.55
Resorcinol, tech., drms, wks	lb.	.68	.75	.68	.75	.68	.74
Rochelle Salt, cryst	lb	.43½	.47	.43½	.47	...	.43½
Salt Cake, dom. blk wks	ton	...	15.00	...	15.00	...	15.00

1 Producers of natural methanol divided into two groups and prices vary for these two divisions; *m* Country is divided in 4 zones, prices varying by zone.

* Spot price is ½c higher.

	Current Market		1943 Low	1943 High	1942 Low	1942 High
Saltpetre, grn, bbls ...100 lb.	8.20	8.60	8.20	8.60	...	8.20
Shellac, Bone dry bbls lb. r	.42½	.46	.42½	.46	.39	.42½
Silver Nitrate, 100 oz, bots ....oz.	...	.32½	...	.32½	.26½	.32½
Soda Ash, 58% dense, bgs, c-l, wks 100 lb.	...	1.15	...	1.15	...	1.15
58% light, bgs cl ...100 lb.	...	1.13	...	1.13	1.05	1.13
Caustic, 76% grnd drms, cl .....100 lb.	...	2.70	...	2.70	...	2.70
76% solid, drms, cl 100 lb.	...	2.30	...	2.30	...	2.30
Liquid, 47-49%, sellers, tks .....100 lb.		1.95	...	1.95	...	2.00
Sodium Acetate, 60% tech, powd, flake, bbls, wks lb	.05	.06	.05	.06	...	.05
Benzoate, USP dms ....lb.	.46	.52	.46	.52	.46	.50
Bicarb, bbl, wks 100 lb.	1.70	2.05	1.70	2.05	1.70	1.85
Bichromate, cks, wks (*FP*) lb	...	.07¾	...	.07¾	...	.07¾
Bisulfite powd, bbls, wks .....100 lb.	3.00	3.60	3.00	3.60	3.00	3.10
35-40% bbls, wks ..100 lb.	1.40	1.65	1.40	1.65	1.35	1.80
Chlorate, bgs, wks c.l. lb.	...	.06¼	...	.06¼	...	.06¼
Cyanide, 96-98%, wks ..lb.	.14½	.15	.14½	.15	.14	.15
Fluoride, 95%, bbls, wks lb.	.07¼	.08¼	.07¼	.08¼	...	.08
Hyposulfite, cryst, bgs, cl, wks .....100 lb.	...	2.25	...	2.25	...	2.45
Metasilicate, gran, bbl, wks .....100 lb.	2.50	3.55	2.50	3.55	...	2.50
Nitrate, imp, bgs (A) ton	...	33.00	...	33.00	...	29.35
Nitrite, 96-98% dom, cl. lb.	...	.06¼	...	.06¼	...	.06¼
Phosphate, di- wks ..100 lb.	6.00	7.25	6.00	7.25	...	...
cryst, bgs, c-l ....100 lb.	2.55	2.70	2.55	2.70	2.55	2.70
Tri-bgs, cryst, wks 100 lb.	2.70	3.40	2.70	3.45	2.70	2.85
Prussiate, yel, bbls, wks lb.	.10	.11	.10	.11		11
Pyrophosphate, bgs wks c-l lb.	.0528	.0610	.0528	.0610	.053	.06
Silicate, 52°, drs, wks 100 lb.	1.40	1.80	1.40	1.80		1.70
40°, drs, wks, c-l 100 lb.		.80	...	.80		
Silicofluoride, bbls NY lb.	.06	.12	.05	.12	.09	.15
Sulfate, Anhyd, bgs 100 lb.	1.70	1.90	1.70	1.90	1.70	1.90
Sulfide, cryst c-l, bbls, wks .....lb.	...	2.40	...	2.40	...	2.40
Solid, bbls, c-l, wks ..lb.	3.15	3.90	3.15	3.90	...	3.15
Sulfite, powd, bbls, wks lb.	.05¼	.06	.05¼	.06	...	.05¼
Starch, Corn, Pearl, bgs .....100 lb.	...	3.46	...	3.47	...	3.10
Potato, bgs, cl .....lb.	...	.0637	...	.0637	.061	.0637
Rice, bgs .....lb.	no stocks		.09½	.10¼	.09	.10
Sweet Potato, bgs ..100 lb.	...	.07½	...	.07½	no stocks	
Sulfur, crude, f.o.b. mines ton	...	16.00	...	16.00	...	16.00
Flour, USP, precp, bbls, kgs .....100 lb.	.18	.30	.18	.30	...	...
Roll, bbls .....100 lb.	2.40	2.90	2.40	2.90	2.40	2.70
Sulfur Dioxide, liquid, cyl. lb.	.07	.08	.07	.08	.07	.09
tks, wks .....lb.	.04	.06	.04	.06	.04	.06
Talc, crude, c-l, NY ....ton	...	13.00	...	13.00	12.50	24.50
Ref'd, c-l, NY .....ton	13.00	21.00	13.00	21.00	17.25	19.25
Tin, crystals, bbls, wks ...lb.	no stocks		no stocks		no stocks	
Metal, (*PC*) (A) .....lb.	...	.52	...	.52	...	.52
Titanium Dioxide (*PC*) ..lb.	.15	.15¾	.15	.15¾	...	.14½
Toluol, drs, wks (*FP*) (A) gal.	...	.33	...	.33	...	.33
tks, frt all'd (*FP*) .gal.	...	.28	...	.28	...	.28
Tributyl Phosphate, dms lcl, frt all'd .....lb.	...	.47	...	.47	...	.47
Trichlorethylene, dms, wks lb.	.08	.09	.08	.09	...	.08
Tricresyl phosphate (*FP*) lb.	.24	.54½	.24	.54½	.25	.31
Triethylene glycol, dms lcl lb.	...	.26	...	.26	...	.26
Triphenyl Phos, bbls (*FP*) lb.	.31	.32	.31	.32	.31	.32
Urea, pure, cases .....lb.	.25	.12 nom.	.25	.12 .26	.18	.12 .20
Wax, Bayberry, bgs .....lb.	...	.60	...	.60	.58	.61
Bees, bleached, cakes ...lb.	.38	.48	.38	.48	.33	.38
Candelilla, bgs .....lb.						
Carnauba, No. 1, yellow, bgs, ton .....lb.	.83¼	.93¼	.83¼	.93¼	.83¼	.89
Xylol, frt all'd, tks, wks..gal.	...	.27	...	.27	...	.27
Zinc Chloride fused, wks..lb.	.05	.0535	.05	.0535	...	.05
Oxide, Amer, bgs, wks lb.	.07	.07½	.07	.07½	...	.07¼
Sulfate, crys, bgs, ..100 lb.	3.60	4.35	3.60	4.35	3.60	3.65

Oils and Fats

Babassu, tks, futures ....lb.	...	.111	...	.111	no prices	
Castor, No. 3, bbls .....lb.	.13¾	.14¼	.13¾	.14¼	.12½	.13¾
China Wood, drs, spot NY lb.	...	.39	...	.39	.39	.40½
Coconut, edible, drs NY lb.	...	.0985	...	.0985	...	...
Cod Newfoundland, dms..gal.	...	.90	...	.90	.85	.90
Corn, crude, tks, wks ....lb.	...	.12¾	...	.12¾	.12½	.12¾
Linseed, Raw, dms, c-l ...lb.	...	.1510	...	.1530	.117	.143
Menhaden, tks .....gal.	...	.1225	...	.1225	...	...
Light pressed, drs .....lb.	.1305	.1307	.1305	.1307	.11	.139
Oiticica, liquid, dms .....lb.	...	.25	...	.25	...	...
Oleo, No. 1, bbls, NY lb.	.13¾	nom.	.13¾	nom.	...	.13¼
Palm, Niger, dms .....lb.	...	.0865	...	.0865	.0925	...
Peanut, crude, tks, f.o.b. wks .....lb.	...	.13	...	.18	.12⅞	.13
Perilla, crude dms, NY (A) lb.	...	.245	...	.245	...	.246
Rapeseed, denat, bulk .....lb.	...	.1150	...	.1150	...	...
Red, dms .....lb.	.13¼	.14¼	.13¼	.14¼	.11¼	.143
Soy Bean, crude, tks, wks lb.	...	.1175	...	.1175	.12¼ nom.	
Tallow, acidless, bbls ...lb.		.14¼		.14¼		
Turkey Red, single, drs ..lb.	.10	.14½	.10	.14½	...	.08¾

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2—SHRIVER, 24″, Iron FILTERPRESS; 24 chamber, open delivery.
1—SHRIVER, 36″, C. I., Plate & Frame FILTERPRESS; 36 chamber, closed delivery.
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4—STEEL CONDENSERS; MOUNTED IN STEEL TANKS; 54½″x8¼″.
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2—JKTD. ROTARY DIGESTORS; 6′ dia. x 13′ l.
1—SHRIVER, C. I., PLATE & FRAME FILTERPRESS; 24″x24″, 24 CHAMBER, OPEN DELIVERY.
2—ROTARY ATMOSPHERIC DRUM DRYERS; 4′x12′.
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Between the Lines

(*Continued from page 72*)

work has been the prospect of twice as much naval stores production for the labor, as formerly. The shortage of labor has been one of the major obstacles to meeting the wartime production levels. If production can be increased with the present labor supply, there is the hope that requirements can be met.

The normal naval stores production is valued at approximately $35,000,000. As a result of these experiments, the Forest Service points out that there is "quite definitely in sight a possible increase of more than 30 percent, or $10,000,000."

Methods of Stimulation

The two most promising experiments reported on at any length were developed in 1942 by the Southern Forest Experiment Station of the U. S. Forest Service. As a result, operators were advised to use one or the other of the treatments according to their individual conditions: bi-weekly chipping and treatment with 40 percent sulfuric acid or weekly chipping and treatment with 25 percent caustic soda.

The chief claim for the sulfuric acid procedure is that it extends the gum flow period from a streak. Thus, if the operator is short of chipping labor, the sulfuric acid treatment bi-weekly reduces the chipping time, and in effect permits working of the entire crop, making approximately the same amount of gum, but using up the timber at half the rate involved in weekly chipping, where no treatment is used.

When labor is plentiful, and the object primarily is to attain maximum production, the weekly chipping and caustic soda method was recommended. Caustic soda does not keep the streaks running longer, as does sulfuric acid, but it does increase the gum flow for the week following the application, and on the basis of earlier experiments a 40 percent production gain was attainable.

On this point a mid-west Congressman was very skeptical when the proposed appropriation was being discussed at this session. "How in the world," he asked, "does the application of chemicals result in such a phenomenal increase in gum flow?"

The principle, he was told, was simply this: Gum flow follows the injury to the tree, in turpentine operations, inflicted by mechanical cutting. Application of these strong acids or alkalies acts to increase the area of the injury Forestry Service men noted that production activity in the tree is affected for a considerable distance above the incision, when chemicals are applied.

As to the possibility of injuring the trees, another question raised by members of Congress, the Forest Service men pointed out that experiments had been under way since 1936, and no apparent injury has occurred to the trees or their tapping life shortened.

Both the sulfuric acid and caustic soda treatments were new in 1943, and certain other weekly acid treatments were discontinued after their advent. Assuming the cost of application to be the same, the caustic soda is cheaper than sulfuric acid. However, the use of such powerful sprays naturally has certain obvious hazards that the operator must guard against. For one thing, it has been considered too dangerous for the average worker to try spraying much above shoulder height, although special equipment is now available. Furthermore, the spraying has to be done with a certain amount of skill, to insure covering the whole streak. The quality of the timber is another factor; poor timber may not justify the added cost of the chemical treatments.

Reports are now awaited on the most recent experiments being conducted at Lake City, Fla., which are described by field service men as even more promising than some earlier efforts.

While the naval stores industry has been kept informed generally on this work, the Forest Service has supplied a brief list of certain reports which give some detail on these operations for the benefit of any others interested (where dates are given they refer to the appearance of the reports in the Naval Stores Review, Savannah, Ga.): "Chemical Stimulation Treatments Recommended for 1943 Operations," by Lefield, Chapman and Snow. Feb. 13, 1943; "Profits from Chemical Stimulation—Part I," by Mitchell and Dorman. July 3, 1943; Part III, July 31, 1943; "Results of Commercial Acid Stimulation Tests, 1942" by Chapman, House and Lefield, July 10, 1943.

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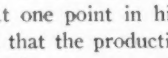
INDEX TO ADVERTISERS

"WE"-EDITORIALLY SPEAKING

The Fourth War Loan is under way and the chemical industry is organized to back the drive to the limit. In various sections of the country special committees have been formed to canvass all employees and executives in an effort personally to acquaint everyone with the facts that bonds will speed victory by providing means of purchasing war materials and further that bonds are the world's safest investment.

Even if the purchase of bonds was not a highly profitable and safe investment, it would be our duty to subscribe to the limit. The war is necessarily piling up huge debts, which will have to be paid sooner or later. It's our war and they're our debts. The fact that we can do our part so safely and easily should remind all of us of the sacrifices that are being endured by members of the armed forces. We don't see how any American can live at peace with his conscience unless he shares in the winning of the war by whatever means he has. Don't wait for a member of the industry to contact you. Buy bonds now!

Since the time, about three decades ago, when the oil industry adopted science and chemical technology to improve its processes the trend has continued to grow at such an accelerated pace that petroleum research has been responsible for a great many of the recent advances in organic chemistry and in chemical engineering in recent years. We've long had a feeling that the petroleum industry is to become a very important factor in chemical production and markets. We think this was borne out recently by the talk of Frank A. Howard, Standard Oil Co. before the North Jersey Section of the American Chemical Society, in which he reviewed the growth of the Standard Oil Development Co. At one point in his talk Mr. Howard said that the production of alcohols from petroleum sources will be a major factor in the next ten years.



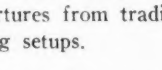
Speaking of the North Jersey section meeting we think this local section of the A. C. S. deserves a compliment on its testimonial dinner and fine tribute to Per K. Frolich, retiring president of the society. In his acceptance of a specially designed pin, awarded him by the local section, Dr. Frolich endeared himself to his audience by his unassuming and sincere remarks. His associates, to whom he tried to give most of the credit for his accomplishments, we think would be the first to say how richly Dr. Frolich deserves the tributes paid him.

Did you know that a ton of cabbage, when dehydrated and compressed, occupies two cubic feet.

We hear that the chemical nature of penicillin is pretty well worked out. However until a commercial method for the synthesis of the material is accomplished, it looks like we will have to depend on the present method of production by fermentation to supply the rapidly growing demands.

A survey by the Office of War Information shows that industrial casualties since Pearl Harbor total about 37,600 killed, 210,000 permanently disabled, and 4,600,000 temporarily disabled. This is many times more than those killed, wounded or missing in military action. This bad safety record, in which the chemical industry shares, deserves never ceasing attention.

We see that the idea of keeping a high rate of business activity and employment in the postwar world by keeping a high rate of production is being tempered by the realization that the problem of marketing will be equally important. We think this is important because the war has shown that science and industry have pretty well licked the matter of supply. The biggest problems ahead are stimulating demand and distributing goods if we are to have continuous high levels of employment. Realizing this some business executives are attacking their marketing problems from radically different standpoints. The results may be some important departures from traditional sales and marketing setups.



The recent Perkin medal address of Gaston DuBois was an intensely interesting commentary on the responsibility of technical men to civilization. As science and technology spread their influence over the welfare of more and more people, the scientist and technical man will have to step out of the laboratory and give some of his attention to "planning for daily living." For an account of Mr. DuBois' remarks, see page 104.

Fifteen Years Ago

From Our Files of January, 1929

The second large merger in the alcohol field in recent months brings together Rossville Co., Orange Grove Refining, Federal Products, Seaboard Chemical and Industrial Chemical. Victor O'Shaughnessy is president and Maurice Levin is chairman of the new organization.

The twelfth Exposition of Chemical Industries will hold its biennial exhibit at the Grand Central Palace, New York, the week of May 6 to 11. It is expected that over 400 exhibitors will display their products, including varied types such as chemical engineering equipment and processes and special machines.

Francis P. Garvan, head of the Chemical Foundation, gives $10,000 to Johns Hopkins University, for the enlargement of the laboratory of Dr. Joseph Colt Bloodgood, cancer specialist. He will also give $10,000 a year for five years for the support of Dr. Bloodgood's research work.

Five out of the nine members of the special committee on finance, American Association for the Advancement of Science, are from the chemical industry. They are A. Cressy Morrison, L. H. Baekeland, Charles H. Herty, August Merz and W. H. Nichols.

Dr. Irving Langmuir, assistant director, General Electric Research Laboratory, Schenectady, is elected president of the American Chemical Society for 1929.

J. T. Baker Chemical Co., Phillipsburg, N. J., purchases assets of Taylor Chemical Co., and organizes the Taylor Chemical Corp. The old company will be dissolved and the new corporation operated by the Baker company as a subsidiary.

Dr. Claude S. Hudson, professor of chemistry and chief, chemical division, Hygienic Laboratory, United States Public Health Service, will receive the Willard Gibbs Gold Medal for 1929, according to an announcement of the American Chemical Society. He is best known for his researches in sugar chemistry.

August Merz was re-elected president of the Synthetic Organic Chemical Manufacturers' Association at its seventh annual meeting.

PART 2: PATENTS AND TRADEMARKS

Abstracts of U. S. Chemical Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of patents are available from the Patent Office at 10 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

From Official Gazette—Vol. 556, Nos. 4, 5—Vol. 557, Nos. 1, 2—p. 469

Agricultural Chemicals

Conditioning soil infected with nematodes. No. 2,335,323. Wendell H. Tisdale to E. I. du Pont de Nemours & Co.

Pest control composition containing as an essential active ingredient a compound containing nitroethylene structure. No. 2,335,384. Euclid W. Bousquet, James E. Kirby and Norman E. Searle to E. I. du Pont de Nemours & Co.

Liquid insecticide spray composition comprising a substantially saturated solution of rotenone in unsymmetrical di-butyl urea. No. 2,335,862. Walter C. Klingel

Improving the blooming of gladioli comprising the steps of fumigating cured gladiolus corms for a period of time and with a concentration of methyl bromide sufficient to cause stimulation but insufficient to injure the corms, and thereafter planting the corms. No. 2,336,270. George E. Lynn and Fred W. Fletcher to The Dow Chemical Co.

Controlling bacteria, fungi and insects, which comprises bringing the same in contact with a composition comprising as an essential active ingredient a linear polymeric guanidine salt. No. 2,336,605. Maurice Ernsberger and John Lontz to E. I. du Pont de Nemours & Co., Inc.

Inactivation of the browning system causing discoloration of freshly cut surfaces of plant tissue, which comprises treating the freshly cut plant tissue with an aqueous solution of thioamide. No. 2,336,928. Frank Denny to Boyce Thompson Institute for Plant Research, Inc.

Cellulose

Making an impregnated cellulose sheet material which comprises passing a water-laid felted cellulose fiber base through a composition composed essentially of a homogenized starch solution incorporated with a rubber latex. No. 2,335,702. Milton O. Schur and Edward M. Archer to Brown Co.

Treatment of cotton characterized by a ready dispersibility in cellulose dispersion agents, which has been subjected to action of aerobic cellulose-decomposing bacteria for a time sufficiently prolonged to decompose cuticle but without substantial decomposition of the cellulose. No. 2,336,252. Florence E. Hooper to The Chemical Foundation, Inc.

Ceramics

Glass in the form of fine fibers composed of CaO, MgO, Al_2O_3, SiO_2, and B_2O_3 as an auxiliary flux. No. 2,334,961. Robert A. Schoenlaub to Owens-Corning Fiberglas Corp.

Producing inorganic fibrous material, a light weight, strong, resilient fibrous bat of glass fibers. No. 2,335,102. William M. Bergin and Allen L. Simison to Owens-Corning Fiberglas Corp.

Improved ceramic glaze, free from compounds of lead and boron and having a firing temperature below 1100° C. No. 2,335,395 Wilhelm Diether to Alien Property Custodian.

Fibrous glass the glass whereof contains silica, boric acid, earth alkalies consisting preponderantly of barium oxide, and trivalent oxides. No. 2,335,463. Hans Steinbock to Alien Property Custodian.

Ceramic product made by firing a ceramic mixture showing upon chemical analysis beryllium oxide, magnesium oxide and alumina together with silica. No. 2,336,182. Taine G. McDougal and Karl Schwartzawalder to General Motors Corp.

Laminated glass, containing an inner layer essentially consisting of 100 parts of cellulose acetate butyrate containing 30-55% butyryl and having a viscosity of 5-75 seconds. No. 2,336,531. Frederick Conklin and Joseph Ryan to Libbey-Owens Ford Glass Co.

Laminated glass, containing an inner layer essentially consisting of 100 parts of cellulose acetate butyrate containing 20-55% butyryl and having a viscosity of 5-75 seconds. No. 2,336,532. Frederick Conklin and Joseph Ryan to Libbey-Owens Ford Glass Co.

Preventing sulfate coatings on glass during annealing which employs the coating of the conveyor belt with an alkaline reacting compound that will absorb sulfurous gases in the lehr. No. 2,336,785. Ernest Guernsey to Consolidated Gas Electric Light and Power Co.

Chemical Specialties

Producing wood preservatives more toxic than the starting material from a mixture of high temperature coal tar fractions. Reissue No. 22,393; Original No. 2,291,329. Jacquelin E. Harvey, Jr. to Southern Wood Preserving Co.

Thickened oil composition. No. 2,334,996. Garland H. B. Davis to Jasco, Inc.

Lubricating composition. No. 2,335,017. John G. McNab, Carroll J. Wilson and Carl Winning to Standard Oil Development Co.

"Self-setting" flexible adhesive compounded essentially of a mixture of concentrated aqueous dispersions of vulcanized and unvulcanized rubber latices, concentrated aqueous solution of sodium silicate and aluminiferous cement. No. 2,335,104. Kenneth W. Britt and Wesley S. Corbin to Scott Paper Co.

Drilling fluid for wells, comprising an aqueous suspension of crushed phosphate rock, and a small percentage of a water-soluble polyphosphoric acid compound. No. 2,335,146. Tirey Foster Ford and Albert G. Loomis to Shell Development Co.

Cleansing materials with a bath containing a non-hydrolyzing synthetic organic washing agent in an amount which per se would be insufficient to effect washing. No. 2,335,194. Joseph Nusslein and Karl Pauser to Alien Property Custodian.

Lubricant comprising in combination a hydrocarbon oil and from one fourth of one percent to fifteen percent by weight of a metal soap of an aliphatic substituted fatty acid. No. 2,235,261. Lloyd L. Davis and Bert H. Lincoln to Socony-Vacuum Oil Co., Inc.

Rubbing polish composition in the form of an oil in water emulsion. No. 2,335,324. Joseph H. Tumbler.

Chemically-resistant lubricant containing mineral white oil, petrolatum (light oil-free), paraffin wax and saturated aliphatic hydrocarbon polymer. No. 2,335,331. Donald L. Wright and Charles W. Bohmer to Jasco, Inc.

Dewaxing a waxy mineral lubricating oil which comprises substantially completely saturating under elevated pressure and at least room temperature a solution of waxy oil in a dewaxing solvent with a gas. No. 2,335,427. Shelby D. Lawson to Phillips Petroleum Co.

Lubricating composition comprising a hydrocarbon lubricant oil and a chlorohydroxy ketone, the latter being present in amount insufficient to affect the viscosity of said lubricant. No. 2,335,434. Glen H. Morey to Commercial Solvents Corp.

Manufacture of soap, a process comprising mixing a saponifying reagent with a source of fat, passing resulting mixture continuously to a zone of centrifugation while mixing the saponifying reagent with the fat and maintaining mixture at a saponifying temperature. No. 2,335,457. Leopold Sender to The Sharples Corp.

Washing and cleaning composition which does not produce deposits and turbidity in hard waters. No. 2,335,466. Anton Volz and Rudolf Watzel to Alien Property Custodian.

Press-stable typographic printing ink vehicle comprising at least 50% by weight of a water-soluble polyhydric alcohol compatible with the aqueous alkali silicate. No. 2,335,505. Albert E. Gessler to Interchemical Corp.

Petroleum demulsifying composition which comprises as a component N-alkylated sulfonamide of water-soluble, oil-insoluble petroleum sulfonic acid. No. 2,335,554. Truman B. Wayne.

Lubricating composition substantially fluid at room temperature. No. 2,335,608. Wilbur Bennett Pings to E. I. du Pont de Nemours & Co.

Treatment of a fluid producing well to increase rate of production which comprises introducing into well a treating fluid comprising an acid capable of forming water soluble salts with the earth formation, containing less than 1.0 per cent of a polyhydroxy aromatic ferric iron sequestering agent. No. 2,335,689. Leo Clark Morgan and Troy J. Stewart to Leo Clark Morgan.

Improved lubricating composition consisting of a mineral lubricating oil and of an oil soluble lubricating oil addition agent. No. 2,335,733. Arthur W. Burwell to Alox Corp.

Printing ink comprising pigment dispersed in a vehicle including a water-precipitable binder dissolved in a water soluble hygroscopic solvent, and from 1 to 3% of an alkylolamine soluble in said solvent. No. 2,335,882. Adolf J. Pingarron to Interchemical Corp.

Printing composition for fabrics and the result-printed fabric. No. 2,335,905. Newell Meade Bigelow and John Elton Cole to E. I. du Pont de Nemours & Co.

Sealing and anti-seize composition for employment with pipe threads and like parts engageable by relative sliding, said composition being effective to provide a coating for retaining the parts against involuntary disassembly and leakage, comprising a solution in a volatile solvent of a permanently thermoplastic vinyl resin. No. 2,335,958. Arthur L. Parker.

Stabilized oil composition, viscous petroleum oil fraction. No. 2,336,006. Everett W. Fuller to Socony-Vacuum Oil Co., Inc.

X-ray contrast composition which is adapted to be used by injecting it into body cavities, said composition comprising a material selected from the class consisting of diiodo tyrosine and dibromo tyrosine suspended in an aqueous colloidal vehicle. No. 2,336,022. Harold H. Lefft and John A. MacLean.

Lubricant comprising a mineral lubricating oil, normally tending to separate and deposit insoluble sludge. No. 2,336,070. Richard C. Clarkson to E. I. du Pont de Nemours & Co.

Lubricating oil composition. No. 2,336,074. Elmer W. Cook and William D. Thomas, Jr. to American Cyanamid Co.

Textile oil comprising a mineral base oil containing as a scouring agent about 5% to 20% of a partial ester of a naphthenic acid and a polyhydric alcohol. No. 2,336,087. Alfred C. Goodings and Harry B. Marshall to Ontario Research Foundation.

Non-foaming shampoo comprising a sulfated mixture of a paraffin oil and rice bran oil. No. 2,336,166. Gifford D. Davis to National Oil Products Co.

Oil well drilling fluid, the step of introducing and circulating in the drill hole a drilling fluid containing Irish moss in aqueous dispersion. No. 2,336,171. John W. Freeland and Harold T. Byck to Shell Development Co.

Lubricant comprising a lubricating oil homogeneously blended with a viscosity index improving amount of a normal mono-olefin polymer

having an intrinsic viscosity in the range of 0.1 to about 0.25 at 210° F. No. 2,336,195. William J. Sparks and Raphael Rosen to Jasco, Inc.

Surface-active agent, derivatives of phosphonic acid. No. 2,336,230. Joseph B. Dickey and Anthony Loria to Eastman Kodak Co.

Parasiticide, an insecticidal composition comprising an active toxicant. No. 2,336,308. Frank B. Smith, George E. Lynn and Fred W. Fletcher to The Dow Chemical Co.

Refractory composition suitable for use in contact with iron-oxide containing basic slag consisting of a mixture of magnesia, alumina, silica and chrome. No. 2,336,360. Robert V. Kleinschmidt and Edward Washken to Bethlehem Steel Co.

Surface-hardening a polyamide body comprising exposing the surface to be hardened of a body of a linear potentially crystalline polyamide to a fluid agent. No. 2,336,384. William O. Baker and Norman R. Pape to Bell Telephone Laboratories, Inc.

Sulfitation product of a nitrosyl halide addition product of a carboxylic-substituted unsaturated hydrocarbon, and method of making a detergent product. No. 2,336,387. Leland James Beckman to The Solvay Products Co.

Phosphoric acid composition, means providing a metallic surface susceptible to corrosion by phosphoric acid, and phosphoric acid containing a small quantity of n-tryamylamine phosphate. No. 2,336,-448. Edwin Cox to Virginia Carolina Chemical Corp.

Printing paste for fabric printing comprising a pigmented lacquer-in-water emulsion containing a concentrated pigment base. No. 2,336,484. Gustave Klinkenstein, Conrad Frey, Edwin Tuttle, Jr. to Maas & Waldstein Co.

Aqueous drilling fluid useful for preventing the heaving shale comprising a finely divided solid, water and a readily water soluble aluminate. No. 2,336,595. George Cannon to Standard Oil Development Co.

Condensation product soluble in lubricating oil and having the properties of depressing the pour point of waxy lubricating oils. No. 2,336,620. Eugene Lieber Aloysius Cashman to Standard Oil Development Co.

Making a cementitious composition which comprises adding to a concrete mix including Portland cement, a mixture of sodium silicate calcium chloride potassium alum diatomaceous earth. No. 2,336,-723. John Drummond.

Manufacture of soap. No. 2,336,893. Ashton Scott to The Sharples Corp.

Non-offsetting printing ink comprising a varnish made up of a liquid polyglycol as a solvent and a resin. No. 2,336,983. Donald Erickson and Paul Thomas to Michigen Research Labs, Inc.

Non-offsetting printing ink comprising a varnish comprising a liquid polyglycol as a solvent for the resin. No. 2,336,984. Donald Erickson and Paul Thomas to Michigan Research Labs, Inc.

Coal Tar Chemicals

Solvent from the refined pitch produced by stripping high temperature coal tar to substantial dryness, and fractionating the overhead material to recover a liquid useful as a good preservative. Reissue No. 22,400. Original No. 2,291,311. Jacquelin E. Harvey, Jr. to Southern Wood Preserving Co.

Coatings

Coating composition comprising a solution containing a condensation product of furfuryl, alcohol, urea and formaldehyde. No. 2,335,-701. Frank B. Root to Ellis-Foster Co.

Coating composition comprising an organic film-forming vehicle containing cellulose nitrate and as a pigment hydrous ferric oxide. No. 2,335,760. Robert Tyler Hucks to E. I. du Pont de Nemours & Co.

Coating composition containing polyvinyl acetate methylal and a melamine-formaldehyde resin. Reissue No. 22,402. Original No. 2,326,698. Robert C. Swain and Pierrepont Adams to American Cyanamid Co.

Coating ferrous metal surfaces which comprises applying to the surface a solution of a coating phosphate which is non-oxidizable by permanganate. No. 2,335,868. Herman J. Lodeesen to Parker Rust Proof Co.

Impregnating and coating composition. No. 2,335,908. Joseph N. Borglin to Hercules Powder Co.

Coating a deck which comprises coating with a bonding mixture containing an aqueous dispersion of rubber and a dehydrating agent, and thereafter coating the mixture, before it has become set, with a settable magnesite composition. No. 2,335,959. Harold K. Patch to Crossfield Products Corp.

Treatment of metals comprising an acid phosphate coating solution containing an organic compound which contains the nitroso group, said compound being dissolved in the solution in an amount that accelerates the coating action of the solution. No. 2,336,071. Wilfred James Clifford and Henry Adams to Parker Rust-Proof Co.

Dyes, Stains

Cyanine dyestuff intermediates. No. 2,334,711. John David Kendall and John Raymond Majer to Ilford Limited.

Preparing organic color compounds in an extremely finely divided form. No. 2,334,812. Stanley R. Detrick and Carl B. Brandt to E. I. du Pont de Nemours & Co.

Preparing gray to black vat dyes which comprises subjecting an animodibenzanthrone to a caustic alkali fusion in the presence of an oxidizing agent. No. 2,334,891. Alexander J. Wuertz, Melvin A. Perkins and William T. Granger to E. I. du Pont de Nemours & Co.

Dyestuffs of the anthraquinone series, the pyridazine derivatives of diphthaloyl acridone. No. 2,334,892. Alexander J. Wuertz and Ralph N. Lulek and William L. Rintelman to E. I. du Pont de Nemours & Co.

Sulfur dye of the group consisting of the dyes obtainable by thionating an omega-sulfoalkyl-alpha-naphthylamine and copper-containing analogues thereof which are produced by thionations in presence of a copper salt. No. 2,335,381. Newell M. Bigelow to E. I. du Pont de Nemours & Co.

Dyestuffs of the anthraquinone series, consisting of alpha-alpha-diarylamino-trianthrimide sulfonic acids and their alkali metal salts. No. 2,335,643. Edwin Buxbaum to E. I. du Pont de Nemours & Co.

Dyestuffs of the anthraquinone series. No. 2,335,698. William L. Rintelman to E. I. du Pont de Nemours & Co.

Tricarbocyanine dyestuff and method of preparation. No. 2,335,861. John David Kendall to Ilford Limited.

Dyeing wooled sheepskins, dyebath which contains Lissamine Green V (Colour Index No. 735) and an assistant, the ratio of said dye to said assistant being about 1 to 2.23, said assistant consisting essentially of cetyl pyridinium bromide and polyglycerol ricinoleate. No. 2,336,221. John Burchill to Imperial Chemical Industries Ltd.

Azo dye compound. No. 2,336,275. James G. McNally and Joseph B. Dickey to Eastman Kodak Co.

Cyanine dye containing a tetrahydrobenzothiazole nucleus. No. 2,336,463. Leslie Brooker and Frank White, to Eastman Kodak.

Dioxazine-dyestuffs of the group obtainable by ring-closing a quinone diamine. No. 2,336,520. Frithjof Zwilgmeyer to E. I. du Pont de Nemours & Co.

Dioxazine dye stuff of the group obtainable by ring-closing a quinone diamine. No. 2,336,521. Frithjof Zwilgmeyer to E. I. du Pont de Nemours & Co., Inc.

Cyanine dye. No. 2,336,843. Leslie Brooker and Frank White to Eastman Kodak Co.

Equipment

Insulated electrical conductor in combination with conductod core of a flexible non-inflammable, moisture-resistant jacket comprising a layer of inorganic fibres and a saturant of polymerized nitrogen halo phosphide. No. 2,334,710. Henry J. Kauth to General Cable Corp.

X-ray generator. No. 2,335,253. Zed J. Atlee to General Electric X-Ray Corp.

Apparatus for utilization of liquefied petroleum gases. No. 2,335,837. Aaron Abramson.

Abrasive article comprising a series of convolutions of thin felted strip of fibrous textile material having abrasive particles and adhesive binder included internally and throughout fibrous strip material of which abrasive article is formed. No. 2,335,902. Albert L. Ball, Raymond C. Benner and Romie L. Melton to The Carborundum Co.

Compensating spectrophotometer. No. 2,336,550. Andrew Kruper to Fisher Scientific Co.

Explosives

Safety carrier for nitroglycerin or other explosives. No. 2,335,779. Alberto Mazzei.

Food Chemicals

Packaging cheese to prevent growth of mold which comprises coating cheese with a petroleum wax containing a higher fatty acid and propionic acid. No. 2,336,358. James D. Ingle to Industrial Patents Corp.

Manufacturing a concentrated milk product, capable of being employed in substantial amounts in bread without causing substantial binding of the bread. No. 2,336,634. David Peeble to Golden State Co.

Industrial Chemicals—Inorganic

Production of alkali metal cyanates which comprises oxidizing a molten alkali metal cyanide by contact with an oxygen-containing gas. No. 2,334,723. Hans R. Neumark and John H. Pearson to General Chemical Co.

Refining process, a continuous process for removal of plurality of constituents from a fluid feed mixture by means of an absorption fluid in which the respective constituents are soluble in a varying degree. No. 2,335,009. Frederic A. Holloway to Standard Oil Development Co.

Stripping wet gas containing liquefiable compounds by contacting it in an absorption zone with a lean absorption medium of predetermined molecular weight, No. 2,335,162. Russell N. Shiras to Shell Development Co.

Making pure chromium trioxide which comprises reacting a chromate of an insoluble sulfate forming metal with sulfuric acid in aqueous solution. No. 2,335,365. Carleton N. Smith to Carbide & Carbon Chemicals Corp.

Making high density periclase wherein hydrated magnesia is precipitated from magnesian brines under conditions such that the precipitated magnesia is in the form of a granular spongy mass of aggravated particles. No. 2,335,374. Teynham Woodward to Westvaco Chlorine Products Corp.

Improvement in the recovery of cement rock values by froth flotation processes. No. 2,335,485. Ludwig J. Christmann and Stephen E. Erickson to American Cyanamid Co.

Production of chlorine dioxide, the improvement which comprises reacting a metal chlorate with sulfuric acid in the presence of a persulfate. No. 2,335,808. Edward Cornelius Soule to The Mathieson Alkali Works, Inc.

Means of protecting light metal surfaces consisting essentially of a liquid hydrocarbon in contact with an aqueous phase which comprises inserting into the container in such position as to be in contact with the aqueous phase of a body of salt from the class consisting of the alkali metal and ammonium zirconates. No. 2,335,-826. Percy Frederick George to The Dow Chemical Co.

Concentrating calcite by froth flotation which comprises subjecting an aqueous ore pulp containing calcite and siliceous gangue min-

erals to froth flotation in presence of a reagent selected from group consisting of sodium soaps of fatty acids. No. 2,336,014. David Walker Jayne, Jr., Stephen Edward Erickson and Harold Milton Day to American Cyanamid Co.

Beneficiation of acid minerals in ore concentrating processes utilizing differential surface wettability principles of separating acidic ore materials from other constituents. No. 2,336,015. David W. Jayne, Jr., Harold M. Day and Elmer W. Gieseke to American Cyanamid Co.

Quaternary ammonium compounds. No. 2,336,179. Friedrich Leuchs to Winthrop Chemical Co., Inc.

Manufacture of sodium or potassium sulfate and hydrogen chloride. No. 2,336,180. Alfred Lippman, Jr. and Rock L. Comstock to Bay Chemical Co., Inc.

Quaternary ammonium compound. No. 2,336,465. Johannes S. Buck Laszio Reiner and Marion Sherwood to Burroughs Welcome & Co.

Preparing a medium for the separation of granular substances of different specific gravities from each other, by the steps of contacting sponge iron with an acid brine solution of lead sulfate. No. 2,336,470. Charles Davis to Chicago Development Co.

Resolving an emulsion of water-in-oil by passing the same through a porous contact mass. No. 2,336,482. Marcus Hatfield to National Carbon Co.

Method of dehumidifying and cooling by means of a deliquescent dehydrating salt. No. 2,336,674. Robert Brace Crawford.

Removing sulfur halide impurities. No. 2,336,688. James Jones and Leo Richards to The Dow Chemical Co.

Acid treatment of an oil well to increase the flow therefrom. No. 2,336,714. Joe Butler and Samuel Winkelmann to Leo Clark Morgan.

Fluorescent barium sulfate material, consisting essentially of substantially pure crystalline barium sulfate having an intensification factor of at least 12. No. 2,336,815. Hardwicke Slingsby Tasker to Ilford Ltd.

Separation of potassium chloride and sodium chloride from solid crude salt mixtures. No. 2,336,854. Lockwood Ferris to Bonneville Ltd.

Fluorine compound represented by the formula $CF_3CH_2OC_2H_5$. No. 2,336,921. Anthony Benning and Joseph Park to Kinetic Chemicals, Inc.

Industrial Chemicals—Organic

Treating impure cresylic acid, by treating with an alkaline aqueous solution of an alkaline soluble lead to remove impurities. No. 2,334,691. Carl N. Andersen to Lever Bros. Co.

Emulsion, having a normally acid reaction, containing oleaginous material, aqueous material, and small proportions of aliphatic polyhydroxy substance and a cation-active substance. No, 2,334,769. Morris Katzman, Frank J. Cahn, and Albert K. Epstein to The Emulsol Corp.

Manufacture of chromane compounds. No. 2,334,743. Robert Behnisch to Winthrop Chemical Co., Inc.

Production of water-soluble trihydric and higher polyhydric alcohols which comprises condensing aldol and acetaldehyde in presence of an alkaline catalyst. No. 2,334,761. William E. Hanford and Richard S. Schreiber to E. I. du Pont de Nemours & Co.

Producing sulfate tall oil and sulfate tall oil products stabilized to oxygen-containing gases. No. 2,334,762. Torsten Hasselstrom.

Preparing disecondary diamines which comprises reacting under anhydrous conditions a primary aliphatic monoamine. No. 2,334,782. Elmore Louis Martin to E. I. du Pont de Nemours & Co.

Hydrolysis of amino acid anhydrides to amino acids by digesting the said anhydrides in an aqueous caustic alkali solution. No. 2,334,986. Frederick C. Bersworth to The Martin Dennis Co.

Hydrolyzing proteins, method of converting the amino acid anhydride content of naturally occurring protein materials into substituted amino compounds. No. 2,334,987. Frederick C. Bersworth to The Martin Dennis Co.

High boiling compounds which comprise principally a tetra-aryl ortho silicate having the formula $(RO)_4Si$ and a similar amount of another organic silicate miscible therewith for lowering the melting point. No. 2,335,012. Lotte H. Johnston to Arthur D. Little, Inc.

Producing alkenyl alcohols which consists in reacting an aliphatic olefin with a saturated aldehyde selected from the group consisting of aliphatic and aryl aldehydes. No. 2,335,027. John Ritter to Standard Oil Development Co.

Dewaxing of oils, the improvement comprising the use on an alkylated meta-dioxane as a dewaxing solvent. No. 2,335,029. Raphael Rosen to Standard Oil Development Co.

Triazine derivatives. No. 2,335,045. Gaetano F. D'Alelio and James W. Underwood to General Electric Co.

Bringing normally water-insoluble heavy metal naphthenates into aqueous solution. No. 2,335,101. Thomas R. Belzer and Harold Schiller to Socony-Vacuum Oil Co., Inc.

Producing a sulphonium compound from a mixture of thio-ethers of substantially different reactivities and an inorganic ester capable of forming sulphonium compounds. No. 2,335,119. Johan Marius Hoeffelman to Shell Development Co.

Water-soluble, colloidal, organic condensation product of formaldehyde, metacresol sulphonic acid, and a di-iodo-salicylic acid. No. 2,335,136. Urbain J. Thuau to Eli Lilly & Co.

Diamino diphenyl methanes. No. 2,335,137. Viktor Weinmayr to E. I. du Pont de Nemours & Co.

Preparation of an alkylene sulphonic acid which comprises reacting an olefine with an addition compound of thioxane and sulfur trioxide. No. 2,335,193. Paul Nawiasky and Gerhard Ewald Sprenger to General Aniline & Film Corp.

Amino-hydroxynaphthalene sulphonic acids or their n-substitution products. No. 2,335,237. Achille Conzetti to J. R. Geigy A. G.

Production of an aliphatic aldehyde, which comprises subjecting glycol to action of heat while in vapor form and in presence of an acid reacting salt and a quantity of water equal to at least 1/3 of a molecule per molecule of the glycol. No. 2,335,238. Henry Dreyfus to Celanese Corp. of America.

Producing hydrocarbon sulfonyl chlorides which comprises **reacting a** saturated aliphatic hydrocarbon of 8 carbon atoms with a mixture of sulfur dioxide and chlorine containing one mol of sulfur dioxide per mol of chlorine. No. 2,335,259. William S. Calcott to E. I. du Pont de Nemours & Co.

Manufacture of imidazole derivatives, which comprises heating in absence of water an alkylating agent which introduces an alkyl substituted by at least one hydroxy group with aryl imidazole derivatives. No. 2,335,271. Charles Graenacher and Paul Streuli and Jost Frei to Society of Chemical Industry in Basle.

3,3-dihalogenoxindoles. No. 2,335,273. Josef Haller to General Aniline & Film Corp.

Condensation products of the anthraquinone series. No. 2,335,412. Winfred Hentrich and Heinz-Joachim Engelbrecht to Alien Property Custodian.

Making a diphenyl carbonate which comprises passing phosgene-containing gas into contact with a first quantity of alkali phenate solution. No. 2,335,441. John H. Pearson and Sager Tryon to General Chemical Co.

Producing polymerization products which comprises heating a n-vinyl lactam with a polymerization catalyst capable of supplying oxygen under reaction conditions and selected from the class consisting of inorganic peroxides and organic peroxides. No. 2,335,454. Curt Schuster, Rudolf Sauerbier and Hanz Fikentscher to Alien Property Custodian.

Water-soluble esterification product, derived by reaction between one mole of a poly-basic compound and two moles of a hydroxylated substituted pyridinium halogen compound. No. 2,335,489. Melvin De Groote and Bernhard Keiser to Petrolite Corp., Ltd.

Synthetizing hydrocarbons which comprises reacting an isoparaffin with an olefin in the presence of an alkylating catalyst. No. 2,335,-507. Aristid V. Grosse and Carl B. Linn to Universal Oil Products Co.

Elimination of asphaltic impurities from phosphoric acid esters selected from group consisting of triaryl and trialkyl phosphates used for extraction of phenols from waste aqueous liquors and freed from phenols but containing asphaltic impurities. No. 2,335,-511. Hinrich Havemann and Kurt Weichert to Alien Property Custodian.

Catalyst for polymerizing drying oils. No. 2,335,520. Edward A. Lasher to California Flaxseed Products Co.

Catalyst for drying oil polymerization, consisting of a drying oil and a relatively small amount of an aryl-substituted aliphatic polyketone, and process of heat-bodying drying oils, characterized by its rapid rate of polymerization when heated to polymerizing temperatures. No. 2,335,521. Edward A. Lasher to California Flaxseed Products Co.

Derivatives of cyclic aminosulphonic acid amides. No. 2,335,599. Fritz Mietzsch, Josef Klarer and Robert Behnisch to Winthrop Chemical Co., Inc.

Non-resinous reaction product of a non-resinous phenol and one or more anacardic materials selected from the group consisting of the shell liquid of the cashew nut. No. 2,335,603. Emil E. Novotny and George Karl Vogelsang to Durite Plastics, Inc.

Preparation of beta-alanine. No. 2,335,605. Joseph H. Paden and Philip M. Kirk to American Cyanamid Co.

Polymers and copolymers of vinyl esters of halophenoxy substituted aliphatic monocarboxylic acids. No. 2,335,651. Gaetano F. D'Alelio to General Electric Co.

Vinyl esters. No. 2,335,652. Gaetano F. D'Alelio to General Electric Co.

Producing beta-aminopropionic acid which comprises reacting a substance of group consisting of dihydracrylonitrile and thiodihydracrylonitrile with aqueous ammonia at elevated temperature. No. 2,335,553. Russell T. Dean to American Cyanamid Co.

Arylaminoanthraquinone compounds. No. 2,335,680. David X. Kelin to E. I. du Pont de Nemours & Co.

Catalytic reforming in the presence of hydrogen in which heated vapors of hydrocarbon oil and hydrogen are introduced into one end of reaction chamber containing catalyst and reaction products are withdrawn from the opposite end. No. 2,335,684. Maurice W. Mayer to Standard Oil Catalytic Co.

Catalytic reforming of a hydrocarbon oil containing both saturated and unsaturated hydrocarbons in the presence of hydrogen and in the presence of a catalyst. No. 2,335,717. Albert B. Welty and Stephen F. Perry to Standard Catalytic Co.

Producing glycerine and a glycol from a polyhydric alcohol selected from the pentitols and hexitols. No. 2,335,731. Robert R. Bottoms.

Production of aliphatic alcohols which comprises leading in the liquid phase a member of the group consisting of butin-2diol-1.4 and its 1.4-substitution products over a metallic copper catalyst. No. 2,335,795. Walter Reppe, Willi Schmidt, Alfred Schulz and Hans Wenderlein to General Analine & Film Corp.

Producing mono-carboxylic acid esters of monochlorhydrin, which comprises causting a carboxylic acid to react with epichlorhydrin in presence of a basic organic nitrogen compound. No. 2,335,813. Gerhard Stein to General Aniline & Film Corp.

Separating 3-picoline; 4-picoline, and 2,6-lutidine. No. 2,335,823. Francis E. Cislak and Frank A. Karnatz to Reilly Tar & Chemical Corp.

Solvent production. Reissue No. 22,401. Original No. 2,291,320. Jacquelin E. Harvey, Jr., to Southern Wood Preserving Co.

Ethers of polychloro-2-hydroxydiphenyl. No. 2,335,845. Gerald H. Coleman and Wesley D. Schroeder to The Dow Chemical Co.

Reaction product of aldehydes and triazine derivatives. No. 2,335,846. Gaetano F. D'Alelio and James W. Underwood to General Electric Co.

Organic peroxide composition, stable, safe, of low heat sensitivity comprising 20 to 65% of benzoyl peroxide and magnesium sulfate heptahydrate. No. 2,335,856. Franciscus Visser't Hooft to Lucidol Corp.

Production of beta-alanine and beta-alanates from acrylonitrile. No. 2,335,997. Gustaf Harry Carlson and Charles Neil Hotchkiss to Lederle Laboratories, Inc.

Coating and impregnating product comprising substantially solid sulphurized castor oil that is insoluble in ether, alcohol, acetone, benzol, carbon disulphide, water and turpentine, and a sufficient amount of diethylene glycol ethyl ether to form an emulsion when mixed with water. No. 2,335,998. Ivor M. Colbeth to The Baker Castor Oil Co.

A process involving reaction of alkali metal from amalgam with a liquid selected from the group consisting of water and alcohols having less than four carbon atoms per molecule. No. 2,336,045. Maurice C. Taylor to The Mathieson Alkali Works, Inc.

Dehydrogenating low molecular weight hydro-carbons which comprises subjecting said hydrocarbons to elevated **cracking temperatures** in presence of tin naphthenate. No. 2,336,054. **Robert G. Atkinson** to The Shamrock Gas & Oil Corp.

Converting residual oils into lighter fractions and coke. No. 2,336,-056. David B. Bell to Kenyon F. Lee.

Producing beta-aminopropionic acid which comprises reacting beta-aminopropionitrile with aqueous ammonia at an elevated temperature. No. 2,336,067. Gustaf H. Carlson to Lederle Laboratories, Inc.

Treating gases and vapors which comprises passing a mixture of hydrocarbon gases and vapors under superatmospheric pressure through lean higher boiling absorption oil in a first absorption zone to absorb certain fractions therefrom. No. 2,336,097. Arthur John Lindsay Hutchinson to the Fluor Corp., Ltd.

Coking badly swelling and caking coals which comprises pulverizing and drying the coal and then subjecting it to a controlled oxidation treatment in the presence of air pressure. No. 2,336,151. William Joseph Kruppa to American Cyanamid Co.

Making carbonized briquettes from coking coals. No. 2,336,154. Clayton S. Wolf to American Cyanamid Co.

Cracking hydrocarbon oils which comprises passing the oil in vapor form while at cracking temperature in contact with a catalyst comprising an alumina gel and maintaining said oil in contact with catalyst. No. 2,336,165. Gerald C. Connolly to Standard Oil Development Co.

Making a modified castor oil substantially free of hydroxyl groups and having two double bonds in the chain but substantially the same number of carbon atoms as castor oil. No. 2,336,186. Floyd G. Nessler to The Sherwin-Williams Co.

Condensation product which comprises heating a hydrocarbon compound containing two conjugated C=C double linkages with a vinyl ester of organic acids, the reaction being performed under such conditions as to prevent any substantial polymerization. No. 2,336,208. Kurt Alder and Hanz-Ferdinand Rickert to Alien Property Custodian.

4-4¹ Derivatives of 2-carboxydiphenylsulphones and esters. No. 2,336,-210. George W. Anderson to American Cyanamid Co.

Isoalkylidene aminophenol. No. 2,336,215. Frederic R. Bean to Eastman Kodak Co.

3-chloro-isobutyl ester of an organic carboxylic acid, the method comprising heating a substantially anhydrous mixture of 1,3-dichloro-isobutane and an alkali metal salt of carboxylic acid at superatmospheric pressure to a reaction temperature between about 170° and about 225° C. No. 2,336,223. Gerald H. Coleman, Bartholdt C. Hadler and Garnett V. Moore to The Dow Chemical Co.

Determining the gelatin temperature and stripping characteristics of a liquid solution capable of gelling at a given temperature. No. 2,336,238. Charles R. Fordyce and Harold F. Vivian to Eastman Kodak Co.

Inactivating styrene polymerization inhibitors in an impure styrene oil containing inhibitors of the acetylenic type. No. 2,336,259. Wilbert A. King, Julius H. Kleiner and Allen R. Krotzer to Allied Chemical & Dye Corp.

Laminated cellulose organic acid ester sheet consisting of at least two sheets, the first sheet being composed of a cellulose organic acid ester and a second sheet composed of a cellulose organic acid ester material which is incompatible with the cellulose organic acid ester material of the first sheet. No. 2,336,273. Carl J. Malm to Eastman Kodak Co.

Manufacture of hexaesters of tetraphosphoric acid comprising heating a phosphorus oxyhalogenide with a neutral phosphoric acid alkyl ester in a molor ratio of about 1:3 under refluxing conditions at atmospheric pressure. No. 2,336,302. Gerhard Schrader.

Making a substitute gas for natural gas having substantially the same characteristics as natural gas with respect to B. T. U. heatng value and burning characteristics. No. 2,336,311. William E. Steinwedell to The Gas Machinery Co.

Aromatic esters of alpha-hydroxyisobutyric acids. No. 2,336,317. Jack T. Thurston and John M. Grim to American Cyanamid Co.

Beta-nitroalkyl ester of alpha-hydroxyisobutyric acids. No. 2,336,318. Jack T. Thurston and Donald W. Kaiser to American Cyanamid Co.

Making a phenyl mercuric carboxylic acid amida which comprises fusing a mixture containing phenyl mercuric hydroxide and a carboxylic acid amide that contains two hydrogen atoms directly attached to the nitrogen atom of the amido group. No. 2,336,359. Morris S. Kharasch to E. I. du Pont de Nemours & Co.

Recovering 1-naphthylacetic acid from a crude mixture of an alkali salt thereof and acid-precipitatable impurities. No. 2,336,364. Vartkes Migrdichian to American Cyanamid Co.

Polymerizable and polymerized dicyandiamideformaldehyde complexes, the process which comprises reacting by condensing substantially simultaneously dicyandiamide, melamine and a relatively minor amount of guanidine carbonate with formaldehyde. No. 2,336,370. Kurt E. Ripper to American Cyanamid Co.

Preparing 4-amino-2-amino diphenyl sulphone which comprises the steps of reacting a p-monocarboxylic aclyamino benzene sulphinic acid with o-nitrohalobenzene. No. 2,336,445. James H. Williams to American Cyanamid Co.

Urea and thiourea derivatives. No. 2,336,464. Johannes S. Buck and Edwin deBear to Burroughs Wellcome & Co.

Forming a bituminous emulsion which comprises dispersing bitumen in an aqueous alkaline solution and stabilizing said emulsion with glycinin. No. 2,336,468. Walter Cole and Walter Buckley to American Bitumuls Company.

Hydrogenating a tall oil which contains substances effective to poison hydrogenation catalysts. No. 2,336,472. Russell Dressler and Robert Vivian.

Distillation of organic liquids polymerizable by heat. No. 2,336,493. Bernard Marks, to E. I. du Pont de Nemours & Co.

P.P di-(phenylpropylidenamino) diphenyl sulphone. No. 2,336,501. George Raiziss to Abbott Labs.

Separating components of a mixture containing 4-picoline, and other heterocyclic nitrogen compounds. No. 2,336,502. Frederick Reimers to Allied Chemical & Dye Corp.

Conversion of asphaltic hydrocarbons, into lubricating oil by contact with molten metal. No. 2,336,505. Vaino Salmi to Metallytic Corp.

Method of resolving an emulsion of water in oil which comprises passing the emulsion through the pores of a porous mass of electrically conductive material. No. 2,336,542. Marcus Hatfield to National Carbon Co.

Producing methyl formate. No. 2,336,585. Erving Arundale and Louis Milkenka to Standard Oil Development Co.

Refining and utilizing hydrocarbon liquids containing soluble gums,

resins and heavier components. No. 2,336,589. Michele Bonotto to Dorothy Di Frasso.

Stabilization of organic substances using a catalyst of the group consisting of copper and its compounds. No. 2,336,598. Frederick Downing and Charles Pedersen to E. I. du Pont de Nemours & Co.

Production of branched chain alkenes from other alkenes including the step of contacting an alkene-containing feedstock. No. 2,336,600. Eric Musther Fawcett to Anglo-Iranian Oil Co., Ltd.

Geochemical exploration for subterranean petroliferous deposits. No. 2,336,612. Leo Horvitz to Esme Rosaire.

Treating a porous insulating material with an aqueous solution of a polyvalent metal salt of a carboxy alkyl cellulose and a volatile alkali. No. 2,336,636. Norman Peterson to The Dow Chemical Co.

Complete recovery of pure diolefins from hydrocarbon fluids. No. 2,336,643. Walter A. Schulze to Phillips Petroleum Co.

Preparing improved viscous liquid to solid resinous products having a molecular weight of at least 1,000, comprising subjecting a mixture of an iso-olefin and an olefin halide to the action of a metal halide catalyst of the Friedel-Crafts type. No. 2,336,648. William J. Sparks, Elizabeth and Donald C. Field to Standard Oil Development Co.

Nitro-aryl amine sulphonic acids of 1,3-benzazoles. No. 2,336,664. Frithjof Zwilgmeyer to E. I. du Pont de Nemours & Co.

Stabilizing an ether by dissolving a member of the class consisting of phenols and their amine salts in an aromatic-aliphatic ether chloride. No. 2,336,667. Edgar Britton and Gerald Coleman to Dow Chemical Co.

Stabilized ether manufactured by dissolving a member of the class consisting of aromatic amines and cycloalkyl amines in an aromatic-aliphatic ether chloride. No. 2,336,668. Edgar Britton and Gerald Coleman to The Dow Chemical Co.

Separating 2,3,6-trimethyl phenol from a mixture of phenols ordinarily associated therewith in petroleum and coal tar alkyl phenols. No. 2,336,720. Aldo DeBenedictis and Daniel Luten, Jr., to Shell Development Co.

Conversion of aliphatic hydrocarbons having at least six carbon atoms per molecule to aromatic hydrocarbons by dehydrogenation and cyclization thereof. No. 2,336,783. Harold Fehrer to Process Management Co.

Interpolyamide melting above 165 degree C. and soluble in hot aqueous alcohol, comprising the reaction product obtained by heating hexamethylenediamine and sebacic acid in substantially equimolecular proportions, and tetramethylenediamine and adipic acid in substantially equimolecular proportions. No. 2,336,824. Richard Wiley to E. I. du Pont de Nemours & Co.

Pyrimidine compounds. No. 2,336,825. Robert Williams and Joseph Cline to Research Corp.

Pyrimidine compounds. No. 2,336,826. Robert Williams and Joseph Cline to Research Corp.

Conversion of aliphatic hydrocarbons having at least six carbon atoms per molecule to aromatic hydrocarbons by dehydrogenation and cyclization thereof. No. 2,336,900. Hugh Taylor and Harold Fehrer to Process Management Co., Inc.

Sulphonamide derivatives of urea and thiourea. No. 2,336,907. Philip Winnek to Americcan Cyanamid Co.

Preparation of thiophene comprising contacting a gaseous mixture containing acetylene and hydrogen sulphide. No. 2,336,916. Michael Miller to Imperial Chemical Industries, Ltd.

Producing oxygen-containing partial oxidation products from hydrocarbons and chemically uncombined elementary oxygèn. No. 2,336,919. Augustus Batchelder and Irving Levine to Standard Oil Co. of Calif.

Reacting an aromatic dinitrose compound with an alkaline sulfide whereby a mixture comprising a quinone diexime and free sulphur is formed. No. 2,336,941. Elbert Ladd, and William Horst to United States Rubber Co.

Polymerizing a solution containing cellulose aceto-crotonate, vinyl acetate and benzoyl peroxide. No. 2,336,985. Ernest Freund.

Manufacture of amines, containing at least one aliphatic hydrocarbon radical and at least one alkylol radical as substituents for hydrogen of ammonia. No. 2,337,004. Edward Chwoegler to Sharples Chemical.

Alkylation process which comprises contacting an alkylatable organic compound containing a hydrogen atom capable of replacement by an alkyl group and an alkylating agent at alkylating conditions with a catalyst comprising an aluminum halide in admixture with a halide salt of a cyclic nitrogen base. No. 2,337,014. Chester Crawford and William Ross to Shell Development Co.

Isomerization process which comprises contacting hydrocarbons comprising an isomerizable hydrocarbon with a molten catalyst comprising aluminum chloride and pyridine hydrochloride, said catalyst containing aluminum chloride. No. 2,337,015. Chester Crawford and William Ross to Shell Development Co.

Leather

Preparing tanning agents and steps comprising the sulfonation of aromatic compounds containing phenolic hydroxy groups, causing the thus formed warm sulfonic acid to react with natural resins and then sulfonating the reaction product. No. 2,335,947. Ernst Koch to Alien Property Custodian.

Medicinals

17-hydroxy-3-keto-compounds of the cyclopentano polyhydropkenanthrene series and method for producing. No. 2,334,695. Adolf Butenandt and Lothar Strassberger to Schering Corp.

Therapeutically useful heterocyclic compounds 2-(p-aminobenzenesulphonamido)-pyridine-5-sulphonic acid. No. 2,335,221. Arthur James Ewins and Montague Alexander Phillips to May & Baker, Ltd.

Manufacture of tartar emetic employing antimony metal, antimonyl derivatives of a saturated aliphatic acid containing an alpha hydroxy group. No. 2,335,585. Newell A. Davies to American Cream Tartar Co.

Steroidal hormone intermediates and their preparation. No. 2,335,616. Frank H. Tendick and Elmer J. Lawson to Parke, Davis & Co.

Preparing germicidal organo-mercury products that comprises condensing substantially equimolecular proportions of the disodium salts of tetrabromfluorescein and dihydroxymercurifluorescein. No. 2,335,703. Theo Schwarz to Industrias Proquifa.

1-o-hydroxyphenoxy-3-alkoxy-2-propanols and/or-2-propanones. No. 2,336,093. Adolf Grün and Willy Stoll to J. R. Geigy A. G.

Preparing silver allantoinate. No. 2,336,131. Charles F. Schaffer.

Asymmetric arsenobenzene. No. 2,336,853. Alfred Fehrle and Hubert Oesterlin, Walter Herrmann and Friedrich Hampe to Winthrop Chemical Co.

Glycosides of 2-alkyl-1-4-naphtho-hydroquinone, said glycosides being prepared as therapeutics and being characterized by antihemorrhagic activity. No. 2,336,890. Byron Reigel and Perrin Smith to Abbott Labs.

Metals, Alloys

Polished metal article of manufacture having a stainless steel surface and method of imparting a lustrous surface to stainless steel. No. 2,334,698. Charles L. Faust to Battelle Memorial Institute.

Electrolytic solution for anodic polishing of metals selected from the group consisting of iron and its alloys, nickel and its alloys and German silver. No. 2,334,699. Charles L. Faust to Battelle Memorial Institute.

Age-hardening copper-base alloy comprising amounts of nickel and arsenic. No. 2,334,753. Donald K. Crampton, Marion and Henry L. Burghoff, to Chase Brass & Copper Co., Inc.

Alloy steel containing chromium, antimony and the remainder principally iron. No. 2,334,869. Russell Franks to Electro Metallurgical Co.

Austenitic alloy steel containing chromium, an austenite-forming element from the group consisting of nickel and manganese, and remainder principally iron. No. 2,334,870. Russell Franks to Electro Metallurgical Co.

Applying spray metal to a metal surface with a high degree of bond. Reissue No. 22,397. Original No. 2,320,327. John Frank Meduna to Metallizing Engineering Co.

Spray metal coated, metal surfaced article. Reissue No. 22,398. Original No. 2,320,329. John Frank Meduna to Metallizing Engineering Co., Inc.

Forming zirconium oxide refractories of high resistance to thermal shock. No. 2,335,325. Eugene Wainer to The Titanium Alloy Mfg. Co.

Polishing stainless iron and stainless steel by anodic treatment. No. 2,335,354. James N. Ostrofsky to Rustless Iron & Steel Corp.

Inhibitor for acid baths for pickling metals. No. 2,335,452. Franz Schelling to Alien Property Custodian.

Treating steel containing elongated non-metallic, non-carbonaceous inclusions that are plastic at the hot-working temperature of the steel. No. 2,335,506. Raymond A. Grange to U. S. Steel Corp. of Delaware.

Removing antimony from impure lead containing antimony but substantially no tin. No. 2,335,569. Walter T. Monson, Harold L. Humes and Richard P. E. Hermsdorf to The American Metal Co., Ltd.

Solder for soldering foils of aluminum and aluminum alloys with one another, including bismuth, lead parts, tin, cadmium and silver. No. 2,335,615. Fred Strasser to Alexandre Clavel.

Thermocouple wire consisting of an alloy of platinum and gold, wherein gold content does not exceed. No. 2,335,707. Johann S. Streicher to The American Platinum Works.

Treating impure lead containing arsenic and antimony. No. 2,335,758. Max F. W. Heberlein and Nevin R. Bierly to The American Metal Co., Ltd.

Making prosthetic articles by electro-deposition of metals. No. 2,335,774. Charles A. J. Landry.

Electrodepositing ductile thick coatings of palladium. No. 2,335,821. Edmund Merriman Wise and Raymond Francis Vines to The International Nickel Co., Inc.

Cast iron grit containing silicon, nickel, chromium, the nickel and chromium being present in the ratio of about 3:1 to 4:1. No. 2,336,001. John T. Eash and Kenneth A. De Longe to The International Nickel Co., Inc.

Treating metal surfaces which are susceptible to rusting, comprising projecting upon said surfaces finely divided particles of ferrophosphorus at such a velocity that said surfaces are simultaneously cleaned and rendered rust resistant. No. 2,336,020. Herbert J. Krase to Monsanto Chemical Co.

Treatment of metals, comprising an acid phosphate coating solution containing an organic compound which contains the nitroso group, said compound being dissolved in the solution in an amount that accelerates the coating action of the solution. No. 2,336,072. Wilfred James Clifford and Henry Howard Adams to Parker Rust-Proof Co.

Rapid direct analysis of oxygen in steel. No. 2,336,075. Gerhard Derge to Carnegie Institute of Technology.

Vaporizing metal comprising steps of providing on surface of a refractory core a helical channel having wall portions of refractory material, introducing metal to be vaporized into said channel, and electrically heating the portions of the channel to vaporize said metal. No. 2,336,138. Adriaan Jacobus van Hoorn and Gerard Thurmer to The Hartford National Bank & Trust Co.

Production of stainless steel alloys of appreciable columbium contents. No. 2,336,237. Alexander L. Feild to Rustless Iron & Steel Corp.

A brick tile or the like, for use in the building of walls of metallurgical reheating furnaces, said brick having a coating of metal from the group consisting of nickel, nickel-copper, nickel-chromium and nickel-chromium-iron alloys adherently anchored to at least one surface thereof and integral therewith. No. 2,336,366. William Alvin Mudge to The Internaticnal Nickel Co., Inc.

Separating acidic ore materials from non-metallic ore constituents the step comprising subjecting the ore in an aqueous pulp to a concentrating operation. No. 2,336,437. Stephen Edward Erickson to American Cyanamid Co.

Aluminum base alloy, containing from 1 to about 15 per cent magnesium and from about 0.0005 to about 0.02 per cent beryllium. No. 2,336,512. Phillip Stroup to Aluminum Co.

Metal electroplating where in a nickel surface other than bright or mechanically buffed nickel is first electrobuffed and then chromium plated. No. 2,336,568. Henry Holden Pray to Battelle Memorial Institute.

Inhibiting formation of black spots on tinned copper which consists in electro-depositing on the tinned surface an amount of at least one of the metals of the group consisting of nickel, cobalt and iron sufficient to inhibit black spot formation. No. 2,336,615. Herbert Jennison, Helen Jennison and John Bradley to The American Brass Co.

Inhibiting formation of black spots on tinned copper by contact with liquids food and beverage products. No. 2,336,616. Herbert Jennison, Helen Jennison and John Bradley to The American Brass Company.

Heat treating electrical silicon steel. No. 2,336,617. John Johnston to U. S. Steel Corp. of Del.

Conditioning iron ores to make such ores suitable for introducing into an open hearth melt. No. 2,336,618. Russel Jones.

Ore concentrating processes utilizing differential surface wettability principles of separating acidic ore materials from other ore constituents. No. 2,336,868. David Jayne, Harold Day, Elmer Gieseke to American Cyanamid Co.

Paints, Pigments

Disazo pigments and method of producing. No. 2,335,535. William B. Reynolds to Interchemical Corporation.

Azo pigments and method of producing. No. 2,335,537. William B. Reynolds to Interchemical Corp.

Azo pigments and method of producing. No. 2,335,538. William B. Reynolds to Interchemical Corp.

Disazo pigments and method of producing. No. 2,335,539. William B. Reynolds to Interchemical Corp.

Incorporating in paint a pigment selected from the group consisting of zinc sulfide and titanium dioxide a diatomaceous earth filler and citric acid. No. 2,336,728. Howard Hall to The Dicalite Co.

Paper and Pulp

Treatment of liquids from paper-making processes by removing solid materials from waste paper produced in the manufacture of paper. No. 2,335,209. Robert B. Booth to Chemical Construction Corp.

Making paper of silky appearance and improved finish which comprises preparing a mix containing fibers of Musa textiles which normally have a tendency to flocculate. No. 2,336,367. Fay H. Osborne to C. H. Dexter & Sons, Inc.

Making cast surfaced coated paper which comprises applying to one face of a paper web a layer of coating composition comprising pigment and adhesive in aqueous suspension. No. 2,337,013. Donald Bradner and William Montgomery to The Champion Paper and Fibre Co.

Petroleum Chemicals

Condensation process for alkylating butenes with isobutane to form a high octane motor fuel. No. 2,334,861. Vernon O. Bowles to The Lummus Co.

Alkylating iso-paraffinic hydrocarbons with olefinic hydrocarbons employing evaporative cooling. No. 2,334,955. David H. Putney to Stratford Development Corp.

Operating a dehydro-aromization system for converting low octane number and chiefly aliphatic naphthas into high octane number motor fuels. No. 2,335,610. William B. Plummer to Standard Oil Co.

Production of conjugated diolefins which comprises condensing an olefin of at least 3 carbon atoms with formaldehyde in the presence of an aqueous acid-acting catalyst. No. 2,335,691. Henry O. Mottern to Jasco, Inc.

Preparation of motor fuel which comprises continuously flowing a mixture of an isoparaffin and acid alkylating catalyst through a reaction zone. No. 2,335,704. Robert L. Smith to Universal Oil Products.

Improved Diesel fuel. No. 2,335,953. John H. McCracken and Edwin M. Nygaard to Socony-Vacuum Oil Co., Inc.

Motor fuel production, reacting a low-boiling isoparaffin with low-boiling olefins and olefin polymers. No. 2,336,005. Frederick E. Frey to Phillips Petroleum Co.

Sweetening gasoline which comprises contacting said gasoline with an aqueous solution of sodium hydroxide at a temperature of approximately 50-100° F. No. 2,336,109. Charles Doak Lowry, Jr., and Robert E. Sutherland to Universal Oil Products Co.

Producing naphthalene which comprises cracking a charging stock consisting only of Mid-Continent gas oil in liquid phase to gasoline under cracking conditions in the absence of added hydrogen. No. 2,336,244. John Happel to Socony-Vacuum Oil Co.

Petroleum Refining

Production of hydrocarbon oils by catalytic cracking of higher boiling hydrocarbon oils at temperatures of from 300° to 700° C. in the presence of a silica gel-containing catalyst. No. 2,334,871. Gerhard Free and Wihelm v. Fuener to Alien Property Custodian.

Production of hydrocarbon oils by destructive hydrogenation of carbonaceous materials under elevated pressure and at a temperature of from 300° to 700° C. No. 2,334,872. Gerhard Free and Wilhelm v. Fuener to Alien Property Custodian.

Isomerization of alpha olefins which comprises converting butene-1 into butenes-2. No. 2,334,998. Arthur A. Draeger and Joseph Savelli to Standard Oil Development Co.

Refining mineral white oils which comprises treating a petroleum oil with sulfuric acid of above 93% concentration. No. 2,335,006. Albert P. Giraitis to Standard Oil Development Co.

Reducing an olefin content of an olefin containing hydrocarbon fraction boiling in the gasoline range. No. 2,335,246. Vladimir Haensel and Vladimir N. Ipatieff to Universal Oil Products Co.

Breaking petroleum emulsions of the water-in-oil type, which consists in subjecting the emulsion to the action of the demulsifier. No. 2,335,262. Melvin De Groote and Bernhard Keiser to Petrolite Corp., Ltd.

Removing weakly acidic sulfur compounds from hydrocarbon oil. No. 2,335,347. Timothy L. McNamara to The Pure Oil Co.

Isomerization of a hydrocarbon feed consisting essentially of normal pentane. No. 2,335,406. Arthur R. Goldsby and Eugene E. Sensel to The Texas Co.

Dehydrogenating aliphatic hydrocarbons which comprises subjecting an aliphatic hydrocarbon at a temperature of from about 750° F. to about 1400° F. to contact with a catalyst prepared by mixing hydrogels containing at least one component having dehydrogenating activity in a partially dehydrated condition. No. 2,335,550. John F. Sturgeon to Universal Oil Products Co.

Combination thermal and catalytic cracking process, the method that comprises fractionating crude petroleum to obtain a residual fraction and a condensate fraction, subjecting oil to catalytic cracking in a catalytic cracking zone. No. 2,335,551. Richard F. Trow to The Texas Co.

Refining of refractory hydrocarbons, dealkylating refractory hydrocarbons containing polymethyl, polycyclic aromatics. No. 2,335,596. Robert F. Marschner to Standard Oil Co.

Separating relatively volatile hydrocarbons from a manufactured gas obtained by a process involving the pyrolytic decomposition of petroleum oil. No. 2,335,855. Edwin L. Hall to The United Gas Improvement Co.

Heating paraffin in oil wells. No. 2,335,961. Alfred W. Pick to I. C. Miller.

Continuous cyclic method for the catalytic conversion of fluid petroleum hydrocarbons into high-quality gasoline. No. 2,336,041. Thomas P. Simpson, John W. Payne and John Crowley, Jr., to Socony-Vacuum Oil Co., Inc.

Continuous process for converting residual oil into gasoline and gas oil fractions and into coke. No. 2,336,057. David B. Bell to Kenyon F. Lee.

Hydrocarbon oil selective cracking process wherein vaporous conversion products formed are separated by fractionation into fractionated vapors boiling in the range of gasoline and light and heavy reflux condensate subjected to pyrolytic conversion, said light reflux condensate subjected to catalytic conversion and the conversion products from both fractionated as aforesaid. No. 2,336,126. Davis Read, Jr., to Universal Oil Products Co.

Removal of mercaptan compounds from petroleum oils. No. 2,336,174. Amiot P. Hewlett to Standard Oil Development Co.

Refining of mineral oils, controlling the interface level between two primary liquid phases in a petroleum oil treating operation. No. 2,336,205. Earl E. Willauer to Standard Oil Development Co.

Cracking hydrocarbon oils which comprises passing the oil to be cracked in vapor form in contact with a catalyst formed by mixing silica gel with alumina hydrosol. No. 2,336,597. Gerald Connolly to Standard Oil Development Co.

Converting a reduced petroleum crude oil into hydrocarbon fractions boiling below about 800° F. No. 2,336,639. Walter F. Rollman to Standard Oil Development Co.

Removing hydrogen sulfide from petroleum hydrocarbons. No. 2,336,651. Reginald Stratford to Standard Oil Development Co.

Treating cracked gasoline. No. 2,336,736. Elmer Kanhofer to Universal Oil Products Co.

Converting low boiling olefinic hydrocarbons to higher boiling hydrocarbons within the gasoline boiling range. No. 2,336,793. Edwin Layng and Louis Rubin and Robert Ruthruff to The Polymerization Process Corp.

Isomerizing a normally liquid paraffin hydrocarbon boiling in the gasoline range. No. 2,336,862. Aristid Grosse and Herman Pines to Universal Oil Products Co.

Increasing the antiknock properties of a normally liquid hydrocarbon fraction boiling in the gasoline range and containing paraffins of relatively low antiknock value. No. 2,336,863. Aristid Grosse and Herman Pine to Universal Oil Products Co.

Mixing hydrocarbons containing mercaptans with an aqueous alkaline solution in order to remove said mercaptans. No. 2,336,896. William Shiffler and Laverne Elliot to Standard Oil Co. of Calif.

Catalytically increasing the antiknock value of hydrocarbons, without substantial alteration of the boiling range thereof. No. 2,337,003. Walter Schulze to Phillips Petroleum Co.

Photographic Chemicals

A photographic silver halide emulsion selected from the group consisting of silver chlorobromide, silver bromide and silver bromiodide emulsions. No. 2,334,864. Burt H. Carroll and John Spence to Eastman Kodak Co.

Manufacturing film printing screens which comprises applying a thin film of polyvinyl alcohol or its derivatives still soluble in water and a chromate to a gauze. No. 2,335,021. Franz Nestelberger to the Alien Property Custodian.

Making a photographic positive on phototropic material whereby to provide a fugitive print. No. 2,335,465. Otto Vierling to Alien Property Custodian.

Photographic film comprising a support, a light sensitive silver halide emulsion layer and at least one auxiliary layer comprising an ester of cellulose with an acid having at least three carboxylic groups. No. 2,335,944. Adolf Jung and Gustav Wilmanns to General Aniline & Film Corp.

Photographic coloring and toning bath comprising an aqueous solution containing a water-soluble salt of hydrocyanic acid and a water-soluble salt of cadmium. No. 2,335,972. Virgil B. Sease and George A. Dawson to E. I. du Pont de Nemours & Co.

Preparing a color correcting image in a multi-color printing element comprising a plurality of superposed layers containing silver and dye images. No. 2,336,243. Wesley T. Hanson to Eastman Kodak Co.

Photographic element comprising at least two photographic silver halide emulsions positioned with the grains of one emulsion adjacent to the grains of another emulsion. No. 2,336,260. Edward B. Knott to Eastman Kodak Co.

Improving the keeping properties and stability of photographic sensitive silver halide emulsions which comprises incorporating in the emulsion an oxyhalogen pyrimidine which releases a halogen oxyacid during storage of said emulsion. No. 2,336,261. Edward Bowes Knott to Eastman Kodak Co.

Product sensitive to heat and/or light essentially consisting of a paper sheet surfaced with a salt of anhydroglucuronic acid and a metal selected from group consisting of mercury, silver, vanadium, molybdenum, iron, bismuth, cobalt, copper, lead, manganese, thallium and uranium. No. 2,336,299. John Russell to Eastman Kodak Co.

Diazotype photographic material comprising a light sensitive diazo derivative. No. 2,336,309. John M. Snell and Arnold Weissberger to Eastman Kodak Co.

Preparing flexible cellulose triacetate materials, a film and filament forming solution comprising a non-acetone soluble cellulose triacetate in a solvent mixed with acetone to an amount approximately 44 to 199% of the amount of said solvent. No. 2,336,310. John Spence and Sterling S. Sweet to Eastman Kodak Co.

Additional patents on photographic chemicals, resins, plastics, rubber, textiles, water sewage and sanitation from the above volumes will be given next month.

Abstracts of Foreign Patents

Collected from Original Sources and Edited

Those interested in obtaining further information concerning the patents reported below should communicate with the Patent Department, CHEMICAL INDUSTRIES. Photostated copies of Canadian patents are available from the Commissioner of Patents, Ottawa, Canada.

CANADIAN PATENTS

Granted and Published March 9, 1943.

Manufacture of liquid alkyd-modified resinous product. No. 410,973. Canadian General Electric Company Limited. (Edmond F. Fiedler.)

Multilayer photographic elements comprising a plurality of light-sensitive layers of cellulose ester containing silver halides, each layer containing an alkali-soluble color-former dispersed therein and the layers being separated by gelatine layers. No. 410,978. Canadian Kodak Company, Ltd. (Leopold D. Mannes and Leopold Godowsky, Jr.)

Multilayer photographic element comprising three emulsion layers sensitive respectively to different regions of the spectrum and between the sensitive emulsion layers filter layers containing differently colored dyes. No. 410,979. Canadian Kodak Company, Ltd. (Leslie G. S. Booker and Robert H. Sprague.)

Sensitive photographic element comprising a filter layer containing a bis-(1-pyrrocoline) or a bis-(2-phenyl-1-pyrrocoline) methine cyanine salt. No. 410,980. Canadian Kodak Company Ltd. (Leslie G. S. Brooker and Robert H. Sprague.)

Photomechanical process of making a colored painting and three-color separation records thereof. No. 410,981. Canadian Kodak Company, Ltd. (Alexander Murray and John A. C. Yule.)

Dry reagent for direct testing, without external heating, for the presence of sugar in solutions. No. 410,986. The Denver Chemical Manufacturing Company. (Alexander Galat.)

Apparatus for forming a thermoplastic strip. No. 410,988. Detroit Macoid Corporation. (George Strathearn.)

Hectograph copy mass comprising tanned gelatin and a reaction product of a tanning compound and a substance other than gelatin adapted to convert the tanning compound to a non-tanning compound. No. 410,990. Ditto, Incorporated. (Johan Bjorksten and William J. Champion.)

Granted and Published April 6, 1943.

Volatile fluid power generator using gasoline as source of fuel. No. 411,568. William F. Ney and Benedict M. Thielmann.

Apparatus for conditioning piece material, granular material or other material more or less finely distributed, by means of a gaseous medium. No. 411,570. Folke Gosta, Robert Magnusson and Gustav Valdemar Oholm.

Method of preparing and using diastase in the manufacture of alcohol. No. 411,571. Harry G. Atwood.

Centrifugal blower or pump. No. 411,573. Alfred Buchi.

Multiple track drier and method of kiln dry lumber. No. 411,574. James Forrest Cobb.

Method of drying wood and wood products by distilling water therefrom. No. 411,582. Monie S. Hudson.

Machine for coating with dust (as of insecticide or bleach) the constituents of a granular mass of material. No. 411,584. Harold J. Kemp.

Machine for coating a quantity of seed grain with fine chemical dusts and particularly mercienal dusts. No. 411,585. Harold J. Kemp.

Process of dehydrating waste liquors from cellulose pulp production. No. 411,592. Forsten Ramen.

Method of preparing catalytic heater mats consisting of fibrous material impregnated with a platinum catalyst solution and a thorium oxide solution. No. 411,594. John Hogg Robertson.

Fluid purifying device. No. 411,599. Gilbert Carleton Unger, Jr.

Electric steam generator. No. 411,600. Glenn W. Watson.

Two-stage pressure regulator as for compressed gases. No. 411,607. The Bastian-Blessing Co. (William C. Buttner).

Fluorescent material comprising a matrix of alkaline earth metal silicate activated with europium. No. 411,620. Canadian General Electric Company Limited. (Alfred H. McKeag and Peter W. Ranby).

Preparation of emulsion of the type having a continuous phase containing a large amount of water and a small amount of dispersing agent. No. 411,623. Carbide and Carbon Chemicals Corporation. (Charles H. Schuh).

Colored threads formed of glass fibers or filaments impregnated with latex extending into the interior of the thread and between the fibers or filaments thereof. The latex having a colored matter incorporated therewith. No. 411,625. The Clark Thread Company. (William M. Camp).

Process for producing alkyl bromide comprising reacting a stoichiometric mixture of bromine, sulfur dioxide and a saturated aliphatic alcohol by heating in presence of about 75% water on the basis of the sulfuric acid formed. No. 411,627. The Dow Chemical Company. (David J. Pye and Harry H. Purcell).

Method and apparatus for use in casemaking for pneumatic tires. No. 411,628. Dunlop Tire & Rubber Goods Company Limited. (Harry Willshaw & Harry Taylor).

Seal means for a fluid pressure pump. No. 411,629. The Duriron Company, Inc. (Oystein Jacobsen).

Insecticide comprising furfural-acetophenone. No. 411,630. General Chemical Company. (James W. Swaine).

Production of nitrile by reacting an ester from the group consisting of sulfunic acid and phosphoric acid esters with a metal cyanide in a non-aqueous liquid medium having a boiling point above about 130° C. to form the nitrile. No. 411,631. General Chemical Company. (Albert E. Rainsford & John H. Pearson).

Method of treating stainless steel wire of high tensile strength and including a substantial proportion of chromium. No. 411,641. National Standard Company. (Elgin C. Domm).

Surface-active wetting agent produced by heating a halogenated, non-gaseous, aliphatic petroleum hydrocarbon with a tertiary base selected from the group consisting of amines, phosphines, arsines and stibines below their boiling points under substantially anhydrous conditions. No. 411,642. North American Rayon Corporation. (Rudolph S. Bley).

Producing a surface-active wetting agent by heating a halogenated paraffin wax with a tertiary base selected from the group consisting of amines, phosphines, arsines and stibines below their boiling points under substantially anhydrous conditions. No. 411,643. North American Rayon Corporation. (Rudolph S. Bley).

Producing a surface-active wetting agent by heating a halogenated, non-gaseous, aliphatic petroleum hydrocarbon with an organic sulstantially anhydrous conditions. No. 411,644. North American fide selected from the group consisting of dialkyl sulfides, diaryl sulfides and alkylaryl sulfides below their boiling points under sub-Ryon Corporation. (Rudolph S. Bley).

Apparatus for determining the moisture content of baled staple goods by the change in electrical resistance of an element inserted thereinto. No. 411,645. The Ohio State University Research Foundation. (Albert R. Olpin).

Package for medicinal preparations in tablets or ampules. No. 411,651. Schering Corporation. (Arthur F. Peterson).

Production of polymers from a hydrocarbon mixture containing tertiary and secondary olefines. No. 411,653. Shell Development Company. (Sumner H. McAllister).

Polymerizing an olefinic C_3 to C_5 hydrocarbon fraction containing impurities naturally associated therewith comprising amino bases. No. 411,654. Shell Development Company. (Richard M. Deanesly).

Insecticide comprising an unsaturated alicarboxylic ketol having at least 10 carbon atoms. No. 411,655. Shell Development Company. (Seaver A. Ballard & Vernon E. Haury).

Process for producing a liquid polymer of gasoline boiilng range by contacting iso- and normal butylenes in a liquid phase with sulfuric acid to absorb isobutylene, contacting the residual olefinic mixture with stronger sulfuric acid to absorb normal butylenes. Combining the two acids with their absorbed olefines and heating the mixture to a temperature between 150 and 300° F. No. 411,660. Standard Oil Development Company. (William J. Sweeney & Kenneth C. Laughlin).

Processing device for treating heated strands. No. 411,622. Syncro Machine Company. (Richard L. Fern).

Apparatus for treating fibrous asbestos material. No. 411,663. Turner & Newall Limited. (Wilfred J. Ellison).

Detonator shell composed of molded organic plastic having an impact strength of at least 0.75 foot pounds. No. 411,664. Western Cartridge Company. (Frederick R. Seavey).

Conditioning a catalyst prepared from the hydrous oxides of aluminum and a metal of the VI group of the Periodic System prior to use in catalytic reforming. No. 411,665. Standard Oil Development Company. (Paul E. Kuhl).

Conversion of normally gaseous olefins into higher boiling polymers. No. 411,666. Standard Oil Development Company. (Steward C. Fulton & Thomas Cross, Jr.).

Conversion of normally gaseous olefines into higher boiling polymers. No. 411,667. Standard Oil Development Company. (Stewart C. Fulton & Thomas Cross, Jr.).

Cleaning preparation comprising magnesium carbonate and sugar. No. 411,670. Leslie James Howlett, Wesley Henry Howlett & Ronald Henry Warneford. (Leslie J. Howlett).

Treatment of textile materials colored with an anthraquinone dye containing a basic group. No. 411,680. Camille Dreyfus. (Herbert Platt & Alvin W. Bergeron).

Coloration of surface-saponified cellulose ester textile materials in dark shades. No. 411,681. Henry Dreyfus. (George H. Ellis and Alexander J. Wesson).

Machine for coating seed grain with fine chemical dusts. No. 411,682. Harold J. Kemp.

Trademarks of the Month

A Checklist of Chemical and Chemical Specialties Trademarks

454,877. Minnesota Min. & Mfg. Co., St. Paul, Minn.; filed Aug. 12, 1942; for adhesive cements; since Oct. 13, 1943.

455,082. Nylofoam Co., Portland, Ore.; filed Aug. 24, 1942; for detergents; since Oct. 9, 1941.

455,837. United States Gypsum Co., Chicago Ill.; filed Sept. 28, 1943; for lime and gypsum fillers; since Sept. 3, 1935.

456,653. Freedom Oil Co., Freedom, Pa.; filed Nov. 5, 1942; for naphtha solvent; since June 1, 1941.

456,692. Special Chemicals Corp., N. Y.; filed Nov. 7, 1942; for soldering, welding and brazing; since June 1940.

456.697. Special Chemicals Corp., N. Y.; filed Nov. 7, 1942; for metallizing non-conductors; since May 1940.

456,698. Special Chemicals Corp., N. Y.; filed Nov. 7, 1942; to produce antique finish; since Oct. 1939.

456,700. Special Chemicals Corp., N. Y.; filed Nov. 7, 1942; for an aluminum colored coating; since Sept. 1938.

458,998. Central Paint & Varnish Wks., B'klyn, N. Y.; filed Mar. 20, 1943; for paints in dry and paste form; since January 1928.

459,207. Skol Co., Inc., N. Y.; filed Mar. 18, 1943; for soap; since Jan. 25, 1943.

459,321. Turco Products, Inc., Los Angeles, Calif.; filed Mar. 24, 1943; for liquid detergent; since Oct. 29, 1939.

459,771. The G. Edwin Smith Shoe Co., Columbus, O.; filed Apr. 9, 1943; for shoe polish; since Sept. 1, 1943.

460,979. William Russell Bailey, Washington, D. C.; filed May 28, 1943; for prefabricated plastic sheets; since May 24, 1943.

461,073. Jacob Swimmer, Pacific Resin Co.; Los Angeles, Calif.; filed May 31, 1943; for paint; since Jan. 21, 1943.

461,180. Jacob Swimmer, Pacific Resin Co., Los Angeles, Calif.; filed June 5, 1943; for paint; since Jan. 21, 1943.

461,308. The Dicalite Co., Los Angeles, Calif.; filed June 11, 1943; for diatomaceous silica; since May 22, 1943.

462,028. Freda Rath, Plastex Co., Chicago, Ill.; filed July 12, 1943; for cohesive webbing; since Apr. 5, 1942.

462,160. General Mills, Inc., Minn., Minn.; filed July 19, 1943; for proteinaceous coating for paper; since June 22, 1942.

462,239. United Gilsonite Labs, Scranton, Pa.; filed July 22, 1943; for drain pipe solvent and bleaches; since June 1, 1932.

462,368. Hanley & Kinsella Labs, Inc., St. Louis, Mo.; filed July 28, 1943; for non-spray liquid insecticide; since Mar. 13, 1942.

462,453. William Hanks, Shelby, N. C.; filed Aug. 2, 1943; for varnish on textile mill rollers; since July 1, 1943.

462,581. Leonard Freedman & Sons, N.Y.; filed Aug. 7, 1943; for prepared leathers; since July 10, 1943.

462,615. Crowe Chemical Co., Tulsa, Okla.; filed Aug. 9, 1943; for water-phase emulsions; since July 7, 1943.

462,899. D. B. Belli, Inc., San Francisco, Calif.; filed Aug. 21, 1943; for poison oak dermatitis; since Dec. 1941.

462,901. Bray Chemical Co., Inc., Chicago, Ill.; filed Aug. 21, 1943; for cleaning, scouring, and polishing compound; since Apr. 29, 1942.

463.087. Abbott Laboratories, Chicago, Ill.; filed Aug. 30, 1943; for veterinary synthetic estrogenic preparation; since Aug. 17, 1936.

463,141. The Celotex Corp., Chicago, Ill.; filed Sept. 1, 1943; for gypsum plaster and board products; since April 1943.

463,206. Irvington Varnish & Insulator Co., filed Sept. 3, 1943; for flexible extruded plastic tubing; since July 30, 1943.

463,280. Warwick Chemical Co., West Warwick, R. I.; filed Sept. 8, 1943; for amorphous and crystalline hydrocarbon waxes; since Aug. 20, 1943.

463,519. The Klenzoid Corp., Phila., Pa.; filed Sept. 20, 1943; for removing and preventing boiler scale; since Apr. 22, 1940.

463,520. The Klenzoid Corp., Phila., Pa.; filed Sept. 20, 1943; for removing and preventing boiler scale; since Apr. 22, 1940.

463,555. The Selig Co., Atlanta, Ga.; filed Sept. 21, 1943; for disinfectant, germicide, and antiseptic; since Sept. 2, 1943.

463,557. F. Uddo & Sons, New Orleans, La.; filed Sept. 21, 1943; for ammonia substitute; since Mar. 29, 1943.

463,563. Abbott Labs, Chicago, Ill.; filed Sept. 22, 1943; for gonorrhea; since Aug. 27, 1943.

463,571. Kay-Fries Chemicals, Inc., West Haverstraw, N. Y.; filed Sept. 22, 1943; for non-poisonous industrial fumigants; since Sept. 1, 1930.

463,572. Kay-Fries Chemicals, Inc., West Haverstraw, N. Y.; filed Sept. 22, 1943; for agricultural insecticides; claims use since Apr. 4, 1930.

463,595. Dom F. Evia, Hitox Products, N. Y.; filed Sept. 23, 1943; for insecticides; since July 20, 1943.

463,658. Union-Baystate Co., Inc., Cambridge, Mass.; filed Sept. 25, 1943; for adhesive cement; since July 15, 1943.

463,783. Hospital Liquids, Inc., Chicago, Ill.; filed Sept. 30, 1943; for suspensoids, emulsions and medicament vehicles; since Sept. 20, 1943.

463,791. Nyanza Color & Chemical Co., Inc., N. Y.; filed Sept. 30, 1943; for dyestuffs; since Nov. 9, 1931.

463,795. Nyanza Color & Chemical Co., Inc., N. Y.; filed Sept. 30, 1943; for dyestuffs; since Feb. 4, 1938.

463,851. R. T. Vanderbilt Co., Inc., N. Y.; filed Oct. 2, 1943; for preventing metal corrosion; since Sept. 13, 1943.

463,852. R. T. Vanderbilt Co., Inc., N. Y.; filed Oct. 2, 1943; for rubber vulcanization accelerator; since Sept. 13, 1943.

463.906. LST Mfg., Stamford, Conn.; filed Oct. 5, 1943; for antiseptic germicides; since July 5, 1943.

463,917. Shell Oil Co., Inc.; San Francisco, Calif.; filed Oct. 5, 1943; for rust preventative oils and greases; since Aug. 11, 1943.

463,918. Warwick Chem. Co., W. Warwick, R. I.; filed Oct. 5, 1943; for water repellent textile finish; since Sept. 21, 1943.

463,922. American Molding Powder & Chemical Corp., B'klyn, N. Y.; filed Oct. 6, 1943; for cellulose acetate molding powder; since Aug. 15, 1943.

463,968. The Denver Chem. Co., N. Y.; filed Oct. 7, 1943; for identifying body fluids substances; since Sept. 20, 1943.

464,044. Imperial Chem. (Pharm) Slough, Buckinghamshire, Eng.; filed Oct. 11, 1943; for veterinary purgative; since Apr. 30, 1942.

464,046. Imperial Chem. (Pharm) Slough, Buckinghamshire, Eng.; filed Oct. 11, 1943; for anaesthetics; since Apr. 30, 1942.

464,074. The Baker Castor Oil Co., N. Y. and Jersey City, N. J.; filed Oct. 12, 1943; for processed and treated vegetable oil; since Sept. 22, 1943.

Trademarks from Official Gazette of U. S. Patent Office, November 16, 1943 to December 7, 1943.

3-M
454,877

NYLOFOAM
455,082

USG
455,837

FOSOL
456,653

AquiFlux
456,692

METALON
456,697

SMUTBATH
456,698

SPEKALUMINITE
456,700

CEPACO
458,998

SKOL
459,207

SUPERTROL
459,321

SHU-NU
459,771

STABAILEX
460,979

REZOLITE
461,073

REZOLIN
461,180

DROMITE
461,308

PLASTO
462,028

TRITICOTE
462,160

462,239

PARALYTEK
462,368

HANK'S KOTOP
462,453

TEXADERO
462,581

COLLOBASE SUSPENSOID
462,615

RHUSCAPS
462,899

Sparton
462,901

STILRONATE
463,087

CELO-ROCK
463,141

IVI-FLEX
463,206

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463,280

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463,519

"EXOID"
463,520

DISTISAN
463,555

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463,557

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463,563

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463,571

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463,572

Optox
463,595

UBAGRIP
463,658

CROLEUM
463,783

METAMINE
463,791

NYASOL
463,795

NAKON
463,851

TELLURAC
463,852

IR
463,906

SHELLCOTE
463,917

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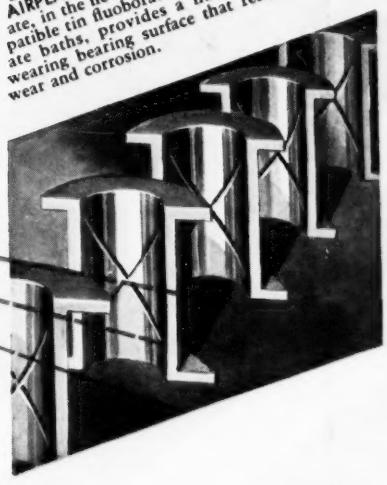

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Ferrous Fluoride
Fluoride Fluxes
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Lithium Fluoride
Magnesium Fluoride
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Potassium Fluoride, Anhydrous
Potassium Fluoride, Crystal
Sodium Bifluoride
Sodium Fluoborate
Sodium Fluoride
Strontium Fluoride

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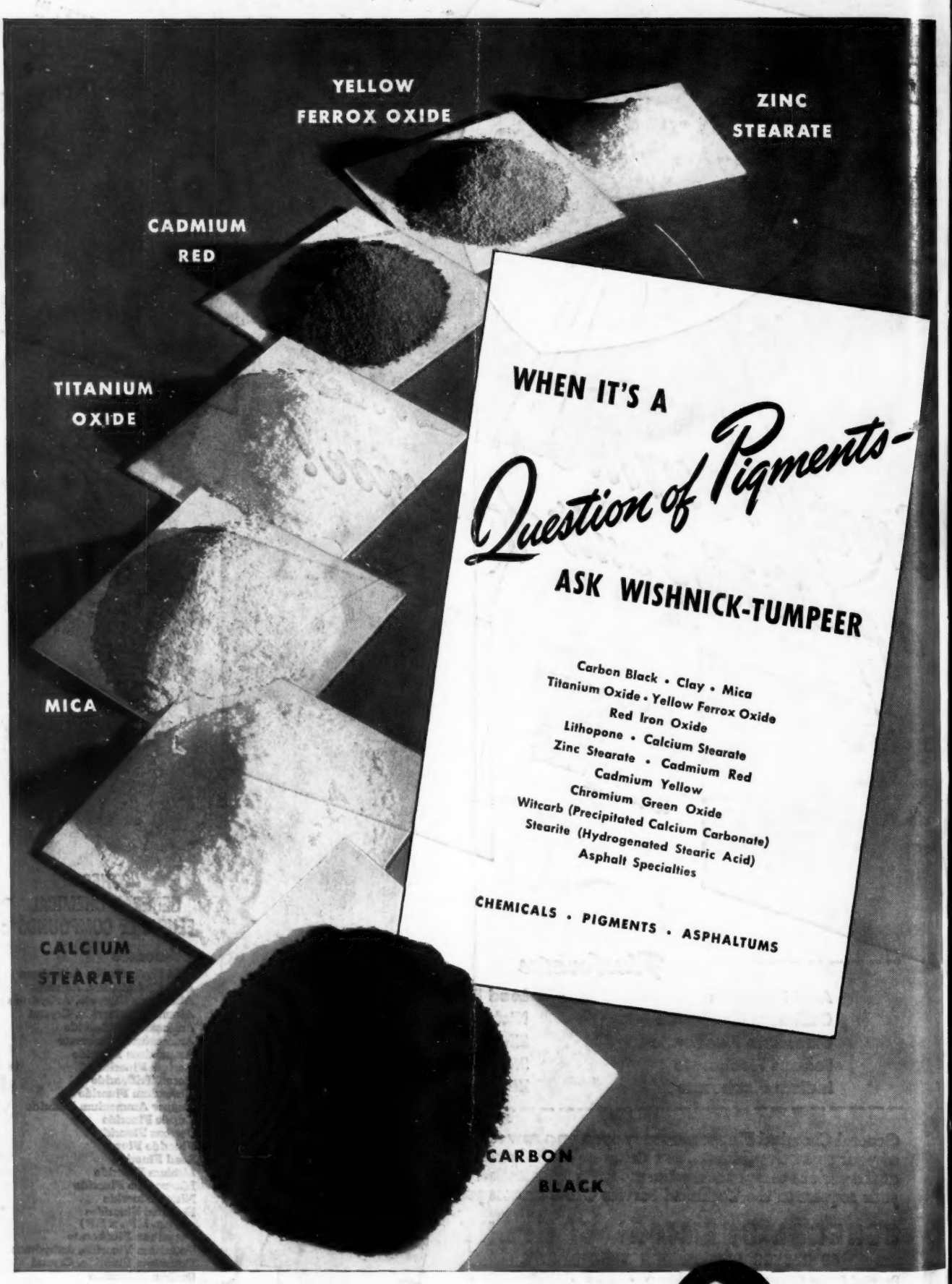

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